



Policy brief:

Research into alternative snakehead feed holds promise for easing ban

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Cambodia has identified aquaculture as one of three pillars of the country's fisheries development. The government's Strategic Planning Framework for Fisheries for 2010 to 2019 considers expanding the farming of fish and other aquatic animals as "essential" given the limited capacity of natural resources to sustain the country's growing population. To support the growth of small, medium and large-scale freshwater aquaculture, government spending on aquaculture has been budgeted at more than \$16 million under the 10-year framework. The aim is to boost production from both freshwater and marine aquaculture to 185,000 tonnes by 2019, up from less than 15,000 tonnes in 2000. The latest figures indicate that the government is well on the way to achieving its goal. On July 1, Agriculture, Forestry and Fisheries Minister Ouk Rabun announced that aquaculture Production had risen to 120,000 tonnes in 2014, up from 90,000 tonnes a year earlier. Yet Cambodia's aquaculture development remains constrained by a 10-year government ban on farming two snakehead species native to the Lower Mekong Basin. Cambodian and Vietnamese farmers typically feed these highly carnivorous fishes with catches of small low-value freshwater fish that are otherwise consumed by the rural poor, hence the reason for the ban. The development of formulated feed as a substitute for these low-value fish is one of the conditions for lifting the ban on farming snakeheads, which are high-value species popular among Cambodians. To meet continued demand since the ban came into force in 2005, Cambodians have increasingly been relying on imports of snakeheads farmed in neighboring Viet Nam - where snakehead farming is legal but faced with environmental challenges and diseases. Farming in Cambodia has meanwhile mainly focused on striped catfish (*Pangasianodon hypophthalmus*), tilapia (*Oreochromis niloticus*), silver barb (*Barbonymus gonionotus*) and a hybrid walking catfish (*Clarias batrachus* x *C. gariepinus*). Research in the Vietnamese province of An Giang in the Mekong Delta has identified 33 fish species used as feed in snakehead culture. More than half were minnows or carps (Cyprinidae), bagrid catfishes (Bagridae), loaches (Cobitidae) and gouramies (Osphronemidae). Many were juveniles of commercially important species including some targeted for aquaculture in Viet Nam such as climbing perch (*Anabas testudineus*), Bocourt's catfish (*Pangasius bocourti*) and Nile tilapia (*Oreochromis niloticus*). Formulated feed recent developments in Cambodia and Viet Nam shows promising research into formulated feed for wild snakeheads that would reduce the demand for small fish. Under a study funded by the AquaFish Innovation Lab of Oregon State University, the Inland Fisheries Research and Development Institute (IFReDI) at Cambodia's Fisheries Administration has been developing indigenous broodstock for domesticated breeding of striped snakehead (*Channa striata*) and then weaning the fry with formulated feed developed by Can Tho University in Viet Nam. The best results were seen with feeding 30-day-old fry at a

rate increasing by 10 percent every three days, which resulted in lower cannibalism and higher survival by the time the fish had reached 60 days. The institute has now taken this research a step further by extending feeding with the formulated feed until the snakeheads reach maturity, which is usually around six months. The experiment has involved about 400 individuals which are the first generation of 100 wild broodstock from Cambodia and 50 domesticated broodstock from Can Tho University. The broodstock were brought to the government's Freshwater Aquaculture Research and Development Centre in Prey Veng Province in late 2013 and early 2014, with spawning induced about a year later. While the wild broodstock were unable to consume the formulated feed, their offspring had no problems. And as of June, some of the females from both the domesticated and wild broodstock were already producing eggs, underlining the pressing need for pilot experimental farms for grow-out using the formulated feed.

Replacing fishmeal with soybean meal, the need to extend government research to commercial farms in Cambodia is highlighted by a new study on formulated snakehead feed by Can Tho University Vice Rector Tran Thi Thanh Hien and her colleagues from the university's College of Aquaculture & Fisheries and the University of Rhode Island in the United States. Published by the journal *Aquaculture* in June this year, the study involved a series of experiments over eight weeks to test formulated diets that replaced fishmeal with soybean meal. Fishmeal accounts for 33 percent of the formulated feed developed by Can Tho University and soared in price to record highs last year following a sharp decline in catches of anchoveta (*Engraulis ringens*), a major component of Peruvian fishmeal for which Viet Nam is the world's fourth-largest importer. In the first experiment with striped snakehead, soybean meal substituted 0, 20, 30, 40 and 50 percent of the fishmeal with or without the addition of phytase as a supplement (phytase is an enzyme that accounts for 0.02 percent of the university's formulated feed). The second experiment conducted the same tests with or without the addition of taurine, an amino acid important in the metabolism of fats. The two experiments showed that soybean meal could replace 30 percent of the fishmeal without phytase or taurine and 40 percent if it was supplemented by the enzyme or the amino acid. A third experiment with Indonesian snakehead (*Channa micropeltes*) showed that soybean meal could also replace 40 percent of the fishmeal when supplemented by phytase. When compared with fish fed on fishmeal alone, the study indicated that diets using soybean meal as a replacement could reduce the cost of feed by almost 12 percent in terms of one kilogram of weight gain. Rice bran and cassava meal Dr Hien and her colleagues have also carried out research into using locally available rice bran and cassava meal to replace both fish and soybean meal in the diets of striped snakehead. In the first experiment, a mixture of rice bran and cassava meal replaced 0, 10, 20 and 30 percent of the fish and soybean meal. No differences in survival or growth were found, except that fish fed with the replacement diet of 10 percent had faster growth than the contra group. In the second experiment, rice bran and cassava meal supplemented with the enzyme alpha-galactosidase were used as a substitute for 0, 50, 60 and 70 percent of the fish and soybean meal. The third experiment used the same rates of substitution with a feeding attractant solution. In both cases, the optimal replacement

rates were 70 percent for growth, 60 percent for food conversion ratio and 50 percent for protein efficiency and economic benefits.



Wild broodstock caught from Kien Svay District in Kandal Province. About 100 wild broodstock are being used in the testing of the formulated feed in addition to 50 domesticated broodstock from Can Tho University in Vietnam



Site of the snakehead feed project of the AquaFish Innovation Lab of Oregon State University at the Freshwater Aquaculture Research and Development Centre in Prey Veng Province



Cambodian aquaculture researcher Nen Phanna with formulated feed at the Freshwater Aquaculture Research and Development Centre in Prey Veng Province.



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