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Helping Mother Nature Spawn - Spawning Kit for Fish Farmers

by Peter Newton

A fish spawning kit developed by Chinese and Canadian researchers is putting smiles on the faces of hatchery owners in southern China, Alberta, and British Columbia. The kit is based on research by Prof Lin Haoren of Zhongshan University of Guangzhou, China and Dr Richard Peter of the University of Alberta. It combines drugs and synthetic hormones to overcome the reluctance of fish to breed in captivity.

With funding from IDRC in 1984, Dr Peter and Prof Lin initiated a cooperative project to test the method on Chinese carp. The project became a good example of capacity building, according to Dr Peter. "As the project continued, I started setting, with Prof Lin, more general objectives. When I was in China, we were developing their research expertise at [Prof Lin's] labs and directing the studies of his graduate students."

Fish farmers raise their stock at high densities in the artificial confines of fish ponds and paddies. The fish do not encounter the environmental cues needed to reproduce naturally. With 3000 years of aquaculture, Chinese fish farmers are familiar with the problem. Since 1958, the Chinese have induced spawning by injecting mature fish with either the hormone HCG (human chorionic gonadotropin) -- found in the urine of pregnant women -- or pituitary extracts from the brood stock. Although effective, this method is extremely costly. A single Chinese hatchery kills as many as 80,000 carp (the main fish raised in Guangzhou) annually to provide extracts to induce spawning.

Dr Peter and other Canadian researchers found that a hormone produced in the brain, luteinizing hormone-releasing hormone (LHRH), makes the pituitary gland produce gonadotropin, which stimulates the spawning process. However, LHRH alone was not enough to induce spawning.

Dr Peter says research on another brain chemical, dopamine, found it to be inhibiting the release of gonadotropin. Dr Peter set out to pinpoint which drug would act as the best "dopamine antagonist". It was found that injections of LHRH accompanied with the dopamine antagonist (pimozide) resulted in high rates of ovulation. Dr Peter conducted his research on goldfish, a close relative of Chinese carp.

In 1984, Dr Peter and Prof Lin began testing the method on Chinese carp, to great success. "The last time I was in China in 1990, one hatchery had doubled its production to about 1.2 billion fry per year," says Dr Peter. "Everyone was smiling and making lots of money because they were more cost efficient and cost effective." Traditional techniques to induce spawning require handling each fish twice. Dr Peter's method requires one injection that administers all the drugs at once.

Handling, damage to the fish, and the spread of disease are all reduced. The new method also allows hatcheries to better predict when spawning will occur and hatcheries no longer have to kill their brood stock for extracts. The kit's success spread quickly. It is now being used in Bangladesh, India, Indonesia, Malaysia, Pakistan, Taiwan, and in salmon fisheries in British Columbia. The Allison Creek Fish Hatchery in Alberta is using it to synchronize the spawning of their trout stock.

Syndel Laboratories in Vancouver have commercialized the kit under the name Ovaprim. It can be used on bream, carp, salmon, trout, catfish, loach and other species.

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