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Research note :

THREATS AND REGULATORY MEASURES IN TRANSGENIC FISH CULTURE

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Gene transfer is a key technology for manipulation of animal genomes. By introducing a key gene whose expression is under novel regulation, biotechnologists can achieve dramatic impacts upon valued phenotypes. Genetic engineering processes are becoming increasingly common and these are being applied to a widening variety of organisms. Genetic modification involves identifying genes to be introduced into fish which expresses the desired traits when introduced into fish. These new genes can come from other species of animals, plants, bacteria and even humans. With the prospect of improved production efficiency, it is not surprising that some aquaculturist want to produce transgenic fish.

The first reports of the application of genetic engineering to animals appeared in the 1980s. Since then, there has been a burst of genetic modification activity in aquaculture research and development. Fish make attractive candidates for genetic modification for several reasons. One is that they produce eggs in large quantities and those eggs develop outside the fish's body. (In contrast, cows and pigs produce fewer eggs at a time, and once scientists insert novel DNA they must re-insert the altered egg into the animal.) A second, equally compelling reason is that aquaculture is one of the fastest growing food-producing sectors globally. Since 1984, commercial aquaculture has expanded at an annual rate of almost 10 per cent, compared with a 3 per cent growth rate for livestock meat and 1.6 per cent rate of growth for capture fisheries.

Given such demand, it is not surprising that the majority of aquaculture biotechnology research and development efforts to date have focused on improving production. Scientists have modified at least 14 fish species—including varieties of carp, trout, salmon and channel catfish—so they will grow 2 to 11 times faster than their non-modified counterparts. Increased growth means reaching marketable size sooner and therefore, reducing overhead costs for fish farmers. A growing number of reports indicate such transgenic fish also show better gross food conversion (i.e. the increase in fish weight per unit of food fed), creating another cost efficiency for fish farmers. In other research, scientists are exploring the use of the human interferon gene to improve disease resistance in carp, which could reduce the amount of antibiotics needed to keep fish healthy and reduce the costs incurred from losses due to disease

Threats regarding the environmental issues:

Conventional aquaculture practices have raised a number of environmental issues including, but not limited to, pollution and the impacts on wild fish populations should fish escape from fish farms. The application of genetic engineering to aquaculture adds significant new dimensions to these existing concerns, especially the multiple possibilities related to gene flow and the ecological disruption associated with escapes.

GeneFlow:

One of the larger environmental concerns raised by transgenic fish is the possibility that a transgenic species raised in open water pens will escape and spread novel traits into the ecosystem by breeding with wild relatives, a biological process known as "gene flow." Gene flow between transgenic or conventionally bred fish and