

## Sustainable Feed Sources for Farmed Fish

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### Abstract

*Fish have been used as human food from time immemorial, and with reports of fish being farmed as early as 2500 B.C., the undisputable fact is that fish is an indispensable part of the human diet and the most efficient protein-transforming higher animal ever farmed by man. In fact, production from aquaculture has greatly outpaced population growth, with per capita supply from aquaculture rising from 0.7 kg in 1970 to 7.1 kg in 2004, representing an average annual growth rate of 7.1 percent.*

*Sometimes well-founded criticism of feed and nutrition practices has been aired by opponents of modern fish farming, including exploitation of wild fish resources, reduced quality and food safety of the final product, as well as the eutrophic impact of the farm effluent on the local environment. These are criticisms that in fact apply to all intensive plant or animal food production. Some criticism is based on misconception or even conscious misinterpretations. On the one hand, fish are certainly our most efficient farmed animals in the sense of nutrient utilization and farming space required. On the other, intensive fish farming offers new challenges not faced by terrestrial animal farming in minimizing the environmental impact.*

*Considering future expansion of aquaculture, development of sustainable feed sources is a prerequisite. The fact that the carrying capacity of all ecological systems is limited is increasingly recognized, even outside the world of natural sciences, as is the insight that most plant or animal based feed sources suitable for farmed animals, including fish, are also suitable for human consumption. This insight leads to the realization that the only sustainable alternatives are scenarios in which farmed animals become net contributors by a transfer of "non-human" food resources into human ones in an ecologically sound way. This presentation discusses fish farming in terms of feed, feed sources, and feed resources, and how all of these issues interact with organic fish farming.*

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