



Announcements

Kona Blue is the United States of America's first integrated hatchery and open ocean fish farm operation. We are seeking applicants for our offshore farm crew to assist in a variety of tasks including the operation of boats, SCUBA diving, feeding fish, cage cleaning, harvesting, maintaining farm & machinery as well as supporting and contributing to the overall development of *Kona Blue*. Extensive SCUBA experience, mechanical and/or boating experience preferred. Good written and verbal communication required. Interested parties are asked to send resumes via E-mail to *darrell@kona-blue.com* or fax to 808 331-8689.

The *Hawaii Organic Farmers Association* (HOFA) 14th annual membership meeting will be held on Saturday, October 14, from 10:30 AM to 3:00 PM at the Kilauea Neighborhood Center on Kauai. There is interest in organic production and marketing among our aquaculture community; the federal government (USDA) continues to work toward organic standards for aquaculture. The meeting is free and open to all. Visit www.hawaiiorganicfarmers.org.

Information Sources

The American Fisheries Society has published the second edition of *An AFS Guide to Fisheries Employment*, which can be obtained at their annual meeting this month in Lake Placid, New York, or by phone, fax, email, or U.S. mail as described on their web site www.fisheries.org. Its 15 chapters include guidance for an educational program, as well as chapters addressing employment in state agencies, the federal government, universities, private consulting, and in aquaculture in particular.

The Oregon Coast Community College sends a reminder that they are offering the "nation's first degree program in Aquarium Science." They point out that their graduates have been hired at major public aquariums and they offer a dvd by mail and a web site with more information. See www.occc.cc.or.us/aquarium.

Updates

Feeding Fish to Fish One of the negative factors laid at the door of commercial aquaculture by some critics is the presumed inef-

Readers' contributions are invited with aloha, and much appreciated, though not all can be used. They may be mailed, faxed or emailed to the editor at this address. Contributors understand that materials may be edited for space and other considerations. This newsletter is part of a cooperative project funded by the University of Hawaii Sea Grant College Program, the UH Cooperative Extension Service, and the State of Hawaii Aquaculture Development Program.

Editor: Jim Szyper

875 Komohana St., Hilo, HI 96720-2757

telephone: 808 981 5199 fax: 808 981 5211 email: jszyper@hawaii.edu

On line: www.uhh.hawaii.edu/~pacrc/bigisaquap/

iciency of feeding wild-caught fish to cultured fish in the form of fish meal. It seems obvious that feeding a pound of fresh wild fish to a cultured fish cannot produce anything near a pound of new product, since no process yields as much as 100% of its inputs. It is also intuitive that processing the wild fish into fish meal first wouldn't make the efficiency of the outcome any greater. However, an interesting chain of calculations makes the situation look better than one might imagine. This comes from a slide show posted on line from this year's WAS meeting in Italy.

The question is whether it is better food production practice to offer for consumption a pound of fresh cultured fish, or a pound of the wild caught "feed grade" fish that would otherwise be used to feed the cultured product. Feed grade fish refers to the generally smaller, bonier fish that are far less desirable for table use in fresh form than the popular types. These species are part of the approximately 30% of the world's wild catch that goes into feeds.

The slide says that, starting with 1000 kg of the feed grade jack mackerel, one can make 240 kg (24% yield) of fish meal. If this constitutes 30% of a prepared feed (which also contains grain meals and other materials), one gets 800 kg of salmon feed. When this is fed to salmon at a feed conversion ratio of 1.3 (kg feed / kg product), one grows 615 kg of salmon. The well-bred meaty salmon yield 474 kg (77%) of H&G (headed-and-gutted) salmon for the table. Alternatively, the 1000 kg of jack mackerel yields 470 kg (47%) of H&G product, very close to the salmon final weight. This chain of thought neglects relative costs, prices and profits for the moment, and presumes all of the percentages as stated. It costs more to bring the 474 kg of salmon to market, but it brings a higher price. The main point is that one doesn't end up with less fish in this case

of feeding fish to fish.

Aquaculture vs. Upwelling It is a familiar fisheries/oceanography fact that the ocean's upwelling areas cover about 1% of the sea and account for about 50% of the marine fisheries landings. A background item in a recent article about seasonal floodplain fisheries notes that "Globally, freshwater fisheries (presumably including aquaculture) are ... producing about a quarter of the world's food fish from less than 0.01 per cent of the world's water resources." Reference: Dey, M.M., and M. Prein, 2006. Community-based fish culture in seasonal floodplains. *Naga* 29:21-27.

Pennsylvania announced their aquaculture conference of this week, and pointed out that the state is "home to more than 140 aquaculture operations (more than Hawaii's official number of businesses) raising 40 species of fish (Hawaii has product diversity but not that many fishes going) with sales value of \$10.9 million (less than half of Hawaii's annual figure)." They are fifth nationally in trout production. Hawaii is not only first nationally but unique for several products, moi and kahala being the most recently famous.

TECHNICAL NOTES

Feeding the Hungry

Long-time aquaculturists may remember early expressions of the idea that aquaculture would contribute to relief of hunger on a global scale. It has indeed done so. The scale and importance of the success, and remaining challenges, are reviewed in the referenced article. This note extracts some major points and notes that the issue of relief has many shared concerns with our perspectives on developed-nation commercial aquaculture and environmental stewardship.

In a tradition practiced widely outside the U.S., fisheries and aquaculture are lumped together for discussion of a big picture. "Fish contributes over 20 per cent of the animal protein intake for more than 2.6 billion people. .. estimated at 34.5 per cent in Malaysia ... over 53 per cent in Indonesia (which has a population of similar size to the U.S.) .. . In many countries of the Asia-Pacific region, rural poor households depend on fish for as much as 60-80 per cent .. ." Much of the fish production moves away from its place of capture or culture. "Today fish is the most internationally traded commodity. .. in 2003 global trade in fish was ... US\$63 billion.. " said the FAO in 2006. "About 40% of global fish production was traded .. in 1998 as compared to 10% of meat production. This is astonishing for a perishable commodity like fish and highlights the increasing demand .. ."

Therefore, "Increased production does not necessarily lead to food or livelihood security. What is needed is for the poor to have access to food." Challenges to that goal include some familiar names with particular character for this case. "Studies .. by the World Fish Center and its partners in 9 countries in Asia indicate .. decline in coastal fisheries, with biomasses down to 5-30 per cent of levels prior to the expansion of fishing. .. (as well as) a decline in the relative abundance of larger and high value species and increase in .. smaller, low value fish." It is well known in development work that the first or nearly first value in fish production in poor areas is the market value, that is, poor people often sell fish for cash and buy less expensive food. Therefore, the decrease of high value species leads to "..declining employment, incomes, food security and rural social stability (poor people move to cities).. .. The major challenge is to rebuild the depleted stocks and exploit them at sustainable levels, and en-

sure that small-scale fishers have access to fisheries resources in the face of competition from large-scale operators." Similarly, the other challenges related to capture fisheries are familiar to us: too many boats and fishers (post-tsunami assistance in Thailand aggravated fishing pressure), destructive gear and practices, environmental protection, and use of aquaculture to enhance depleted stocks (mainly desired in lakes, rivers and reservoirs).

With aquaculture specifically, a current potential benefit is that public-facility or commercial aquaculture can employ some of the "landless labor" in poor rural areas. An FAO estimate says that of about 1.1 billion people "involved in agriculture globally, 450 million work as wage labor earning less than US\$1 a day." It has been recognized for perhaps 20 years that aquaculture can improve the economic and social status of women in places with male dominated institutions, as has been documented in Bangladesh and elsewhere. Other issues are again familiar. Improved breeds (such as the Nile tilapia) have begun to be helpful, with more needed. Regulation of chemicals such as pesticides and antibiotics is seen as important, impacting disease control and environmental protection. Public/private partnerships need advancement, and are not common as in the U.S. The article closes with a discussion of government policy needs and "political will." Some governments have shown to be more motivated and effective (China recognized the urgency and acted vigorously) than others. "Most countries have policies for the development of aquaculture but lack .. strategies, .. plans, and .. allocation of .. resources."

Reference: Gupta, M.V., 2006. Challenges in sustaining and increasing fish production to combat hunger and poverty in Asia. *Naga* 29:4-10.