

Is aquaculture a new technology?

Fish farming has been part of past and present human cultures for thousands of years. Egyptian tomb decorations, dating as early 2500 BC, show that several species of fish including tilapia were being raised. Carp has been farmed in China for thousands of years where it is used as both an ornamental addition to water gardens and as a food staple in many regional cultures. The first records of active oyster culture come from ancient Rome and Gaul (present day France). To this day, the French are enthusiastic oyster consumers.



Oyster farmers on Delaware Bay



Today, in almost every country of the world, some species of fish and seafood is being cultured. Clams, oysters, mussels, shrimp, salmon, tilapia, catfish, sea bass, trout, flounder, carp, cod and hybrid striped bass are just a few of the choices and the list grows every day as aquaculture technology advances.

The culture of oysters in New Jersey estuaries is the oldest form of aquaculture practiced in the State. From the mid 1800's to the first quarter of the Twentieth Century, oysters were the most popular seafood in the United States. They were the food of not only connoisseurs and blue-collar workers but also of convalescents and young children since they were easily digestible sources of high quality protein.

New Jersey clam culture began much later when some forward thinking clam diggers traveled to Virginia to learn the techniques that were being used to increase the harvest and maintain the quality of the product. That industry has grown and New Jersey clam farmers produce high quality, hand harvested product that is sought after in the marketplace.



Different varieties of koi

How can fish and seafood contribute to a healthy diet?

Fish and shellfish products come with some impressive credentials. They are naturally low in saturated fats, cholesterol, sodium, and calories; high in protein, vitamins and minerals; and easily digestible so all those nutrients can be quickly used by the body.

Including more fish and shellfish in the diet is just smart eating. The USDA Dietary Guidelines recommend a minimum of two fish meals per week. Similar recommendations have been made by the American Heart Association, the American Cancer Society and The National Academy of Sciences.

Fatty fish contain potent omega-3 fatty acids that reduce some of the risk factors for cardiovascular disease including heart attack. Cardiovascular disease is the leading cause of death in the United States. Omega-3 fatty acids play a role in preventing irregular heartbeat, reducing plaque build-up on the walls of the arteries, decreasing blood clotting, reducing blood fat, lowering blood pressure and reducing inflammation.

Research indicates that omega-3 fatty acids may play a role in reducing the risk of diabetes, enhancing bone density, aiding in neonatal development, improving the appearance of the skin, reducing depression, aiding nerve function, delaying the onset and reducing the severity of Alzheimer's disease, and reducing inflammation that is found in rheumatoid arthritis, ulcerative colitis and Crohn's disease.



Meals featuring farmed trout and clams

Why should I eat more fish and shellfish?

- ➔ Fish and shellfish are quick, versatile and easy to prepare.
- ➔ Eating fish and shellfish on a regular basis can help you and your family enjoy long, healthy, happy lives.
- ➔ Discovering the gourmet appeal of fish and shellfish can help relieve meal-time boredom.
- ➔ Aquaculture makes fish and shellfish more affordable.
- ➔ Fresh frozen fish and shellfish can be kept handy in the freezer for those



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Farmed clams and oysters

What is aquaculture?

Aquaculture, or fish farming, in the broadest sense, can be defined as the raising of marine and freshwater organisms under controlled conditions. This includes food fish and shellfish, cultured pearls, ornamental and aquarium fish, and plants for food, fuel, garden ponds and aquariums. Aquaculture includes activities to intervene in the rearing process to increase production such as stocking, feeding, transplanting and protecting from predators. Because the process is strictly controlled, farmers can help ensure the quality of the product and the predictability of the harvest.

Some types of aquaculture are practiced in the open ocean and in bays. Marine aquaculture includes products like mussels, clams, oysters, salmon, shrimp, flounder and cod. Freshwater aquaculture production often takes place in ponds and lakes. Catfish, tilapia, bass and some types of shrimp can be raised in ponds. Trout, because they have high oxygen requirements, are often raised in raceways where water continuously flows through the system. Many systems actually recirculate the water after it has been filtered and cleaned. Aquaculture tank systems that reuse the water can even be housed in inner city buildings!

Aquaculture plays an important role in meeting the dietary needs of an increasingly health conscious and growing population. Demand for fish and shellfish products continues to grow and fish farming can help supplement our wild harvest to meet that demand. In the United States, wild harvesters carefully manage the resource to help ensure that the catch is sustainable over a long period of time. However, over 70% of all the seafood consumed in the United States is imported often from countries that do not have strong fishery management programs. The same situation holds true for farm raised products. U.S. aquaculture is subject to strict environmental and product safety standards.

New Jersey currently has over 160 licensed aquatic farmers who are producing a variety of finfish and shellfish for food, ornamental fish and plants for water gardens, and sport fish for stocking and fee fishing operations. New Jersey farmers follow a set of agricultural management practices and a health management plan for their stocks. This helps to protect the natural environment, wild stocks and the aquaculture crop. When you purchase locally grown New Jersey products, you can be assured that the products are wholesome and that you are doing something good for the environment.



Is aquaculture environmentally friendly?



Oyster seed collectors

Yes. There are a number of federal agencies that oversee aquaculture practices including the Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the Department of the Interior, and the Food and Drug Administration (FDA).

The New Jersey Department of Agriculture in conjunction with Rutgers University has established a set of management practices for aquatic farms.

These practices specifically address issues of water quality, wetlands protection, wastewater treatment, water supply and non-native species. These practices are supplemented by an aquatic organism health management plan designed to protect the health of aquaculture stocks, the natural environment and wild populations of finfish and shellfish.

Additional emphasis is being placed on integrated systems that combine aquaculture operations with traditional farming activities to increase our food production capability. Some farmers are so concerned about maintaining environmental quality and meeting high expectations of their customers that they are investigating organic methods of production.

What about the quality of the water in aquaculture systems?

Some people think that the water in an aquaculture system is unhealthy. For an aquatic farm to be profitable, it is essential that fish are grown under the best possible conditions that management can provide. That means good quality water must be maintained. Poor quality water results in oxygen depletion and stress. Proper management dictates that wastes and uneaten feed are neutralized and removed from the system. Additionally, the farmer must abide by existing regulations that mandate that production water is reused or disposed of in a manner that does not harm surrounding water quality such as using it for irrigation.



Greenhouse production system

Why is aquaculture important to the future of our oceans?

Aquaculture is important to the future of our oceans because it can help to provide reasonably priced, good quality, highly nutritious food while helping to maintain the long-term sustainability of our wild caught fisheries. The Food and Agriculture Organization of the United Nations estimates that wild harvest fisheries have reached maximum sustainable yield. However, the world's appetite for seafood is growing. The new USDA dietary guidelines recommend at least two seafood meals per week to maintain good health. Based on that recommendation, U.S. demand is expected to soar.

In the United States, rules and regulations have been developed to manage our wild caught fisheries so that future generations can enjoy the bounty of the sea. Additionally, a number of federal and state agencies oversee the aquaculture industry to help ensure that production methods maintain environmental integrity and protect wild fish populations.

The production of bivalve molluscan shellfish (clams, mussels and oysters) actually provides positive environmental impacts. Because of their three-dimensional structure, they form habitats for other bottom dwelling organisms adding to the important biodiversity of the marine environment. These habitats provide both homes and protection from predators. Molluscan shellfish also absorb nutrients from the water by filtering free-floating algae and particulate matter out of the water. This helps to maintain good water quality and minimizes the loss of oxygen. Good water quality and availability of oxygen is critical to the survival of other marine and aquatic organisms. While clams and oysters are growing, they help to seed wild shellfish beds. Since it takes about three years to reach market size, cultured shellfish spawn up to two times before harvest, sending millions of larvae into the water column. Some of those larvae will set and reseed in other natural areas.

Do aquacultured fish and shellfish contain hormones, antibiotics and other drugs?

Very few drugs have been approved for use with aquatic animals. Strict withdrawal times must be maintained for those drugs that are allowed so that no drug residues remain when the fish reaches the marketplace. FDA's Center for Veterinary Medicine (CVM) works closely with various government agencies and aquaculture associations to help ensure the safety and effectiveness of all approved drugs. In addition to fully investigating the safety of a drug, the CVM also researches the effect it can have on non-target species and the aquatic environment.



Harvesting tilapia

Are aquacultured fish and shellfish safe?

Absolutely! Farm raised oysters, clams and mussels are rigorously monitored by the Interstate Shellfish Sanitation Conference in cooperation with the Federal Food and Drug Administration (FDA). The New Jersey Department of Health and Senior Services administers a certification program requiring all wholesale shellfish dealers to handle, process and ship shellfish under sanitary conditions and maintain records verifying that the shellfish were harvested from approved areas. The New Jersey Department of Environmental Protection (DEP) has established water quality standards for the safe harvesting of shellfish and regularly monitors shellfish growing areas to ensure that water quality is safe. As part of the program, the DEP routinely tests thousands of water samples and, in fact, New Jersey has more sampling stations than any other state on the East Coast. And the good news is that New Jersey's waters are becoming cleaner and more acres are being opened for shellfish. All shellfish growers must comply with the National Shellfish Sanitation Program.



Trout raceways

Aquaculture feeds and drugs are regulated by the federal government. Under the Food, Drug and Cosmetic Act, FDA approves and monitors drugs, human food, animal feed additives, and color additives before they can be used for people or animals. FDA conducts inspections, collects and analyzes samples of fish products to help ensure that unsafe levels of any compounds that are used in animal production do not show up in the marketplace.

Seafood processors and packers must also comply with the requirements of the Hazard Analysis Critical Control Point (HACCP) Program administered by the FDA. This program identifies potential hazards and develops strategies to help ensure that they do not occur. All of these controls help to ensure that seafood products continue to be safe and wholesome foods.

Why should I buy aquacultured fish and shellfish?

Aquacultured fish and shellfish raised in the United States must meet rigorous guidelines for both product wholesomeness and environmental impact. Several agencies at the federal and state level oversee fish farming. Aquatic farmers in New Jersey follow an extensive list of good management practices both to help ensure the quality of their product and to meet government guidelines.

Seafood is the number one food import into the United States and contributes almost 8 billion dollars to our trade deficit. Currently, more than 70% of all fish and seafood consumed in the United States is imported. Of that total, at least 40% is produced by aquaculture, often in countries that have less stringent environmental regulations. As global aquaculture grows to meet the demand, some groups have voiced concerns about possible environmental impacts. New Jersey aquaculture is subject to some of the strictest environmental and product safety rules and regulations found anywhere.

Buying New Jersey seafood not only ensures that you are getting a wholesome product and helping to protect the environment; it also helps to make our country less dependent on other nations for our food supply.