

College of Natural Resources and the Environment

University of Massachusetts Amherst

Competitive Agricultural Systems in a Global Economy

Maximizing Yield and Value of Muscle Tissue Foods, Especially Fish

Issue

These species would supply a valuable source of both protein and oil for consumers. We also see the use of these fish proteins as high value ingredients which would go into a wide variety of food products to improve their functional properties. Plants processing these species could be located anywhere along the Atlantic coast. However, an advantage of locating these plants in the Commonwealth of Massachusetts will be the closeness of the Department of Food Science and the Marine Station to the plants and our ability to give them technical support in their processing operations and also to continue research to improve and expand the quality and quantity of the products produced. We have been working with a local corpora-

tion, to develop an industry based on this technology in Gloucester.

What has been done?

The principal high fat fish species found on the Atlantic coast are the Atlantic menhaden, Atlantic mackerel, and Atlantic herring. The latest data indicates that the annual sustainable yield in these waters is approximately 9 billion pounds of these three species. Herring and mackerel are greatly underused and only a relatively small proportion are caught, primarily for use as bait, mink food, and fertilizers. According to FAO (1997) about 90% of the 2.5 million metric tons of herring caught world-wide is used for non-human consumption. Large amounts of menhaden are caught and processed into fish meal and fish oil. This is a lower value use

than the direct consumption of the protein portion as human food. This is, however, not true of mackerel, which is also a predator. One of the advantages of using menhaden is that it feeds almost exclusively on phytoplankton, that is, it is one of the grazing animals of the ocean and is not a carnivore like most other fish.

These fatty species have been difficult to use for human food because of their size and their high fat content, which makes them unstable to oxidation and they develop fishy, rancid odors. The bone structure of these fish makes mechanical handling of them difficult. The muscle tissue is full of bones. At the Department of Food Science, we have developed technology to separate the fat and the membrane lipid from each other and from the rest of the components including

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bone. This allows a unique way of producing a concentrated protein which does not have the negative characteristics of the initial fish.

Impact

How Can This Technology Help the East Coast Fisheries?

First, it would take the pressure off the over-fished species, giving them time to recover if the fishermen could catch these fatty fish which are not now fished. When the normal commercial species are able to come back, these species will provide an additional source of marine protein to the U.S. population and will be used in products that can be exported. The world supply of fish is currently inadequate to meet the demand.

These species would supply a valuable source of both protein and oil for consumers. Like most all animal proteins, they are highly nutritious. The oil from these species is an excellent source of the n-3

fatty acids about which we hear so much these days as being healthful food sources and important constituents of functional foods designed to improve consumers' health. The use of these fish proteins as high value ingredients which go into a wide variety of food products to improve their functional properties. Plants processing these species could be located anywhere along the Atlantic coast. However, an advantage of locating these plants in the Commonwealth of Massachusetts will be the closeness of the Department of Food Science and the Marine Station to the plants and our ability to give them technical support in their processing operations and also to continue research to improve and expand the quality and quantity of the products produced.

Primary impact area(s)

- Research
- Education
- Extension

Funding sources

- Hatch Act
- National Research Initiative
- Commodity (Fish)

Topics

- Biotechnology
- Economic Response in a Changing World
- Precision Agriculture
- Sustainable Agriculture

Contacts

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