

# ENSURING GLOBAL COMPETITIVENESS OF THE U.S. SEAFOOD INDUSTRY

The U.S. seafood industry faces many challenges and opportunities as it enters the 21st century. These include an increasingly competitive global marketplace, complex trade policies, stricter safety regulations, rising energy costs, food security concerns and an increasingly limited seafood supply. Change also brings new opportunities to expand markets, form strategic alliances and encourage innovations to lower production costs, create new products, add value to existing ones, increase safety and reduce waste. In this new seafood era, science and education are cornerstones for maintaining the vitality of the nation's \$27 billion seafood industry (\$55 billion including consumer expenditures) and its 250,000-member workforce.

To remain competitive, the industry must control the costs of catching, transporting, processing, storing and distributing seafood. The U.S. seafood industry recognizes the benefits of innovation, but it is comprised of mostly small and medium-sized, independent enterprises that simply cannot afford research and development programs. Through its unique capabilities in research and technology transfer, the national Sea Grant network is poised to help the industry increase quality and safety, add value, lower costs and expand seafood supplies and markets.

## Ensuring seafood safety

This encompasses such issues as assisting the U.S. Food and Drug Administration (FDA) in developing appropriate regulations and helping businesses to comply, educating consumers about buying and preparing seafood, educating industry workers about handling and sanitation, and developing improved processing procedures. To enable the industry to comply with new FDA regulations, for example, Sea Grant created the award-winning National Seafood Hazard Analysis Critical Control Point (HACCP)



Alliance. To date, this government-academic-industry partnership has trained 90 percent of the nation's seafood processors in compliance techniques, yet much more needs to be done.

To remain competitive, the industry needs to improve its use of innovative processing technologies, such as microwave, ohmic and inductive heating; pulsed electric field; e-beam radiation; ultraviolet and pulsed light, and ultrasound treatments, among many others. Improvements are also required in many conventional technologies, such as depuration, hot-water pasteurization, anti-microbial additives and treatments, traditional thermal processes, and reduced-oxygen packaging.

Harvesting vessels, food services and retail operations currently remain exempt from federal HACCP regulations. The National Seafood HACCP Alliance program provides a template for training seafood handlers and reducing illnesses attributable to these sectors.

## Ensuring seafood quality

Seafood quality drives the markets, and the American public demands convenient, affordable, high-quality seafood products with extended shelf life. Seafood is especially perishable and varies in composition because of differences in species, age, size and season of harvest. Variability in handling, processing and packaging further contribute to variability in quality. The seafood processing industry requires new technologies to enhance quality, detect decomposition and extend product shelf life at minimal additional cost.

New government mandates to monitor both the safety and quality of seafood products from water to table are on the horizon. Optical image analysis and "electronic nose" equipment could be teamed with computer artificial intelligence to improve the speed and accuracy of quality-measurement systems. Quality-control techniques and better ability to trace seafood through the distribution chain are critical to growing the industry.



## Improving processing technology

International competitiveness requires optimal productivity, quality and value, and the development of new products from traditional raw materials, underutilized species and waste streams. The productivity and competitiveness of seafood processing depends not only on the sources and costs of raw materials, but also on other costly resources: energy, water, labor and waterfront space. Energy requirements for thermal operations (refrigeration, cooking and retorting) are tremendous, yet opportunities exist for conservation through energy and water audits and demonstrating new technologies at processing plants.

Solid waste disposal is a mounting problem for the industry as coastal populations and environmental sensitivities increase. Sea Grant is addressing this problem by developing enzymatic and microbial methods of hydrolysate manufacture for feed and fertilizer production, and improving manufacturing methods and uses of dried meals.

## Adding value

Seafood is among the most expensive items in the American diet due to the high costs of catching, transporting, processing and storing this delicate commodity. Although profit margins are small, improved post-harvest technologies offer opportunities to increase product quality and profits. Seafood muscle tissues are the most valuable component of seafood products—they have many desirable properties due to their water- and fat-binding traits, which can be enhanced by non-seafood additives and novel processing techniques.



Ready-to-cook and ready-to-eat seafood products require processing and storage that can reduce product quality. A better understanding of the chemical and physical properties of seafood muscle components could minimize these effects.

Many fish species are not widely consumed for food because they degrade rapidly. Improved storage and processing techniques would help; but because fish and shellfish are highly variable in their physiology, their properties need to be studied by species. New enzymes, enzyme inhibitors and other “active” proteins, such as antifreeze proteins, could be isolated from seafood sources and used to add value to other seafood.

## Expanding supplies and markets

Sea Grant’s international collaborations in research, education and professional training have involved every aquatic food product and every nation exporting these products to the United States. Foreign seafood producers have technological superiority in many areas that the U.S. industry could study and adapt to the American setting. The creation of the U.S. surimi industry is an example of a new product whose sales were accelerated by the transfer of Japanese experience and scientific information. New communica-

tion technologies, such as video-conferencing and the Internet, provide the means to expand Sea Grant’s scientific exchange programs to benefit the U.S. seafood processing industry and consumers.

## Resources needed

The Sea Grant seafood science and technology community is uniquely positioned to advance the global competitiveness of the nation’s seafood industry, yet meeting this goal will require a continuous commitment by Sea Grant’s many partners and additional funding as well.

New funding is needed to rebuild the nation’s university seafood research and technology infrastructure, including support for new faculty and graduate students, and to expand Sea Grant’s seafood extension capabilities. Additional funds are also needed to support and stimulate cutting-edge research and development activities through competitive, peer-reviewed grant processes. An enhanced research and development program would support additional graduate students and provide industry with the next generation of a trained workforce.

Increased public investment in seafood sciences will create new opportunities to both sustain and expand the U.S. seafood industry and generate millions of dollars of new income and thousands of new jobs. The public will also benefit from an increased investment in Sea Grant seafood safety programs to ensure a seafood supply that is steady, convenient, healthy and safe.



### Mission

The mission of the Seafood Science and Technology Theme Team is to identify and initiate priority research, outreach and education activities to ensure the global competitiveness of the U.S. seafood industry. Sea Grant seafood scientists and technologists are uniquely qualified to provide the research, education, extension and technology transfer needed to help the seafood industry increase quality and safety, add value, lower costs and expand seafood supplies and markets.

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