

# Seafood SAFELY



**T**he seafood business is booming. Per-capita consumption reached 16.3 pounds in 2003 (the last year for which such statistics were available), up 4.4% from year-earlier figures, and chefs are adding fish and shellfish items to the menu in order to provide consumers with more variety and healthy options.

From a foodborne illness standpoint, however, seafood is highly perishable, and can be risky if not handled correctly—through the supply chain and in the back-of-the-house. In addition, many consumers are allergic to seafood, the third leading food allergen (after eggs and milk), affecting as many as one in 50 Americans. And concerns about pollutants and other toxins, particularly mercury and PCBs, are calling into question the safety of both wild and farm-raised fish and shellfish.

In this special report, FoodSafety INSIGHTS reveals how to serve seafood, safely.

“From a food safety and risk management perspective, the pathogens are no different than they were 20 years ago—the inherent risks haven’t changed,” says C. Dee Clingman, president of CDC Global Quality & Safety, consultants based in Orlando. “What is different is the way operators are purchasing. The real challenges in seafood safety have been actuated as a result of the elonga-

tion of the distribution chain. Instead of purchasing locally, we’re purchasing globally, on the international market, including more frozen and farm-raised product.”

And it’s the links in this elongated chain that put more people, more distance and more time in the process, and, according to Clingman, that means a higher probability of something going wrong.

Many larger companies have addressed the problem by taking over as much of the back-end business of seafood as possible. Legal Sea Foods, the Boston-based operator of more than 30 seafood dinnerhouses, celebrated the opening of a new state-of-the-art Quality Control Center that houses receiving, dry and refrigerated storage, fish cutting and food production areas, and a test kitchen and bakery, as well as a complete testing laboratory staffed by a registered sanitarian. All of the company’s seafood passes through the QC Center’s portals.

Built at a cost of \$15 million, the 75,000-sq.-ft. facility employs 150 people and handles all incoming seafood to rigid HACCP standards, and includes advanced traceability and inventorying capabilities. According to QC director Stephen E. Martinelli, the automated cutting lines include keyboards that allow operators to log in all product for recordkeeping. Computerized temper-

ature monitoring systems are used throughout the delivery and production systems to make sure that product stays properly chilled at every point in the distribution chain. “We get the freshest product in daily, and turn it around to the locations within one day, leaving behind a record of every single item that’s come through here,” says Martinelli.



**Legal Sea Foods has its own processing plant and QA lab**

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In addition, the lab is equipped with sophisticated testing equipment, such as a cold vapor atomic absorption machine to test swordfish and tuna for mercury, and the means to do enzyme-linked assay tests for scombroid food poisoning—a naturally occurring process that creates histamines which may cause a severe allergic reaction.

Darden Restaurants, parent of Red Lobster, Olive Garden and several other restaurant concepts, has had an industry leading “pond-to-plate” system in place for more than 25 years, evolving by leaps and bounds as the industry has changed and the global purchasing arena has grown. “Today we are bringing product in from 40 different countries, notes Tom Chestnut, Darden vice president of total quality, “and that all has to be managed.”

To that end, Darden has its own labs in locations throughout North America—including facilities for rigorous organoleptic and microbiological testing—as well as a network of approved labs throughout the world, which allow the company to deal directly with suppliers in markets as far-flung as China, India, Thailand and Singapore.

Once the seafood leaves the lab, it enters a distribution network that is tightly controlled at every turn, including numerous audit functions that ensure proper handling, rotation, storage and so on. Once in the restaurants, fish and shellfish are treated via a HACCP-based system that has also been in place for more than two dozen years.



Red Lobster has had a “pond-to-plate” system in place for more than 25 years

“We’ve taken it down to the simplest common denominator,” explains Chestnut, employing such in-unit safety procedures as constant time-temperature monitoring, color-coded cutting boards, rigorous personal hygiene standards, and other science-based training aimed at managing the critical control points. In addition, the restaurants are monitored quarterly, by both an in-house QA team and a third party. And many of the company’s regional-level QA team comes from the ranks of health-department professionals, to ensure that all of the systems deployed are based on real-world circumstances.

HACCP, in fact, has emerged as one of the operator’s best friends when it comes to serving seafood safely (see related story, p. S-14). At Atlantic Culinary Academy in Dover, NH, part of the Cordon Bleu culinary system, students are taught to follow

HACCP protocols whenever handling fish and shellfish, according to chef-instructor Jack Haggerty. “We teach our students to use it quickly, and handle it properly,” says Haggerty. In fact, the first thing new students learn is food safety training, in a six-week program that runs concurrently with the Basic Skills module. “If they don’t pass the test, they can’t move on.”

In addition, as part of its role to familiarize students with new technologies and products available to them, the school has been participating in an onsite test of electrolyzed water as a sanitizer and dip (see sidebar). A compact wall-mounted unit provides the kitchens with enough acidic and alkaline solutions to conduct all of its sanitizing and rinsing needs. “We use it for produce and seafood, and have found that it can extend shelf life by several days,” says Haggerty. Of course, with a 60-seat public restaurant, L’Esprit, which enjoys seafood sales of about 25% of the total menu mix, very little seafood hangs around the kitchen that long. “We teach freshness and proper handling here, first and foremost.”

Mitchell’s Fish Market is another operation whose livelihood depends on freshness. “Mitchell’s is designed to be the ultimate fresh seafood restaurant,” says Wayne Schick, vice president and executive corporate chef for parent company Cameron Mitchell Restaurants, Columbus, OH, which numbers 15 fish-market based restaurants among its stable of more than half-a-dozen concepts. “Every fish market

has a dedicated seafood walk-in for the proper butchering and storage. Throughout the receiving, butchering and prep processes, product is maintained at 36 degrees.”

In addition to providing temperature control, having separate walk-ins also allows the area to be cleaned daily with a 100-ppm chlorine-based solution. “We have not seen anything that beats the tried-and-true methods of a great sanitation and seafood-handling plan,” says Schick. “Add a very cold storage room and lots of ice, and you have everything you need.”



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**—WAYNE SCHICK, VP AND EXECUTIVE CORPORATE CHEF, CAMERON MITCHELL RESTAURANTS**

## New Processing Techniques

**A** number of new technologies directed at enhancing the safety and extending the shelf life of seafood (as well as other foods) are in various phases of development, including:

**ELECTROLYZED WATER** — Also called anolyte, functional water, super-oxidized water, and electrolyzed acidic water—among other names—electrolyzed water results when ordinary tap water and salt undergo electrolysis, resulting in two new streams of water: a dilute hypochlorous acid solution that eliminates most pathogens from surfaces (including produce, seafood and other foods) within seconds, and an alkaline dilute sodium hydroxide solution that can be used to remove oils, greases and fats in cleaning applications. In food preparation, the electrolyzed alkaline water is often used first to remove gross proteinaceous contamination, followed by application of the electrolyzed acidic solution to eliminate pathogens; this treatment extends shelf life and kills both bacteria and viruses. With some systems no salt residue remains on surfaces, so post-treatment rinsing is not necessary.

**LIQUID ICE** — A mixture of freezing water and ice, made from filtered sea water, is being used on board fishing vessels to extend product shelf life while preserving quality. Because the freezing system is kept between 0°C and -2°C, the fish doesn’t actually freeze but is kept at such a low temperature that its preservation and its quality and properties are better maintained.

**MICROWAVE TECHNOLOGY** — Stemming from a Defense Department initiative, several public and private sector interests have developed a new high-powered microwave sterilization process that could have implications for the seafood industry. The process, which takes 10 minutes to sterilize fish (compared to an hour-and-a-half for conventional canning) involves sealing product in an airtight plastic tray, submerging it in a water bath, and then microwaving. The speed of the process, while not appropriate for all foods, alleviates some of the textural damage of retorting, while still achieving a high pathogen kill rate.

**OZONE TREATMENT** — Ozone is a naturally occurring substance that can also be generated in controlled environments—such as aquaculture farms or seafood processing facilities—to effectively control specific bacteria, viruses and molds. It is the strongest oxidant and disinfectant available, yet decomposes into oxygen once its work is done.

**PROCESSING UNDER PRESSURE** — In high pressure processing (HPP)—also referred to as ultra high pressure processing (UHP) or hydrostatic pressure processing (HHP)—food is subjected to elevated pressures (from about 14,000 pounds per square inch, or psi, to 130,000 or more, depending upon the product). HPP has proved very effective in killing/inactivating many foodborne pathogens (including *Listeria*, *salmonella* and *E. coli* O157:H7, as well as yeasts and molds), and is capable of extending shelf life far beyond that of thermal processing methods such as pasteurization. Seafood does particularly well under pressure; one of the most exciting new applications for HPP is in the area of shellfish, such as lobster, which can be processed right in the shell.

## ALLERGIES

**S**eafood, including fish, shellfish and mollusks, is the third leading cause of food allergy (after eggs and milk), according to the Food Allergy and Anaphylaxis Network (FAAN). A recent study published in the *Journal of Allergy and Clinical Immunology* indicated that as many as 1 in 50 American adults may be allergic to shellfish (especially shrimp, crab and lobster), compared with 1 in 250 who may be allergic to fish. The fish most commonly associated with allergic reactions include cod, salmon, trout, herring, sardines, bass, orange roughy, halibut and tuna—some of the most common varieties on menus. (Canning tuna or salmon sometimes changes the fish protein enough that fish-allergic individuals can tolerate them, but not always.)

People who are allergic to one type of shellfish or finfish have a good chance of being allergic to other types of shellfish or finfish as well. Some consumers who are allergic to shellfish (such as shrimp) are not allergic to mollusks (i.e., oysters, clams).

While many people know they have food allergies and will take the necessary steps to avoid those foods, it is not safe to assume that it's a case of letting the buyer beware, especially in the case of young children.

Last summer, the National Restaurant Association teamed up with Phil Lempert, the food

editor of NBC's "Today Show," to launch a public service tool for consumers called the Food Allergy Buddy (FAB) Dining Card. The card, available as a free download from <http://www.foodallergybuddy.com/>, helps diners to easily communicate any specific food allergies to waitstaff and chefs.

## PRECAUTIONS TO TAKE

- ◆ Make sure key unit personnel are trained in how to respond to allergic reactions as well as other medical emergencies; CPR and emergency first-aid training is never a bad idea, for the safety of both employees and guests
- ◆ Some operators put a note on the menu inviting customers to advise their servers of any food allergies or special dietary requests; waitstaff should always be trained to handle such information in a sensitive, caring and responsive manner
- ◆ Maintain separate fryers for shellfish, mollusks, and fish, as the oil can cause allergic reactions in non-seafood; allergic persons should be cautious about ordering fried food
- ◆ Maintain separate prep and assembly surfaces for the same reason (always a good idea anyway)
- ◆ Be careful in describing combination seafood menu items that contain multiple types of seafood ingredients; all ingredients—not just the principle one—should be listed or made available
- ◆ The following can contain anchovies or other fish: Caesar and other salad dressings, Worcestershire sauce, marinara sauce; hot dogs, pizza toppings, bologna and ham can all contain surimi

## TOXINS

### ABOUT MERCURY AND METHYLMERCURY

**A**fter years of scientific reviews and consumer press, it seems that consumer concern about environmental toxins in seafood has finally reached some sort of critical mass. In California, a 2004 law mandates that retailers post warnings that pregnant women and children limit their intake of certain seafood products that contain large amounts of mercury. Last fall, Safeway Inc.—one of the nation's largest grocery chains—announced that it would post such warnings nationwide. And the Cheesecake Factory has quietly taken several fresh tuna items off the menu, including its Grilled Fresh Ahi Tuna Burger. Less well-circulated—but gaining ground—are concerns about levels of PCBs (polychlorinated biphenyls) in farm-raised salmon, which along with sustainability issues have caused many operators to move to wild-caught salmon.

While many experts argue—and convincingly at that—that the health benefits from eating seafood far outweigh any negatives, the point is that the issue has appeared on the consumer radars, and the thoughtful marketer of seafood must take note. “We now have testing capabilities that can detect parts per billion, not just parts per million,” says Stephen E. Martinelli, director of Legal Sea Foods Quality Control Center. “That allows us to stay way ahead of the curve of scientific evidence.”

- ◆ Mercury is a naturally occurring element and a part of the earth's crust, oceans and atmosphere.
- ◆ Most fish contain trace amounts of methylmercury, the organic form of mercury found in bodies of water. At high levels (more likely to occur in such pelagic species as shark, swordfish, king mackerel and tilefish), methylmercury may harm an unborn baby or young child's developing nervous system, which is why the federal government has stringent regulations regarding mercury levels in the fish.
- ◆ The FDA's limit on mercury is 1 ppm (parts per million)

SOURCE: Real Mercury Facts

### PCBS IN FOOD

Unfortunately, PCBs and similar compounds are so widespread in the environment that they are in the air we breathe, the water we drink and swim in, and the foods we eat. Since they are virtually impossible to avoid, it is important that information is available so that consumers can make informed choices about how to 1) minimize PCB intake in the diet, and 2) choose foods that provide the greatest health benefits relative to the trace amounts of PCBs they may contain.

While trace amounts of PCBs do exist in salmon, both wild and farmed, they are well below the Food and Drug Administration (FDA) tolerance level of 2,000 parts per billion (ppb). Recent tests show farmed salmon averages 27 ppb (parts per billion)

SOURCE: Salmon of the Americas