Seafood Safety: How to Cook Seafood Safely while Maintaining Taste and Quality

Summary:

In 2008, the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) was asked to provide guidance to the National Marine Fisheries Service (NMFS) and the Food and Drug Administration (FDA) on cooking protocols for seafood in order to develop consumer guidelines to ensure safe consumption of seafood. The general charge to the subcommittee on seafood was to determine how to cook seafood safely. Conclusions and recommendations of the subcommittee's work were published in 2008, and the report indicated that there's still a lot more research to be done.

Source:

At the 2009 International Boston Seafood Show, a panel of experts discussed the NACMCF report in the conference session "Safe to Eat vs. Fit to Eat." They offered statistics on foodborne illnesses in seafood and focused on the challenges still ahead in the world of consumer cooking instructions. Panelists were Barbara Blakistone, Ph.D, Director, Scientific Affairs, National Fisheries Institute; Toni Manning, Director of Consulting, Eurofins Scientific, Inc., and Lisa Weddig, Director Technical & Regulatory Affairs, National Fisheries Institute. SeafoodSource.com attended the session and provides an account of it here.

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I. Seafood Safety & Foodborne Illness – Quick Facts

Lisa Weddig, Director, Technical and Regulatory Affairs, National Fisheries Institute

The Centers for Disease Control and Prevention (CDC) estimates that there are 76 million foodborne illnesses per year, 325,000 people are hospitalized per year and there are over 5,000 deaths per year (based on most recent 1999 estimate).

Some recent foodborne illness outbreaks that we've seen include: *E. coli* O157:H7 in frozen pizza, *E. coli* O157:H7 from frozen ground beef, *C. botlinum* from hot dog chili sauce and *Vibrio parahaemolyticus* from raw oysters and last year over 200 illnesses were recorded from *Vibrio parahaemolyticus* and *Campylobacter* in raw clams. An outbreak is when you have 2 or more people who consume the same food and get the same illness and a case is the number of people who are made sick.

Salmonella seems to have cornered the market of foodborne illnesses (last year there were 1,400 salmonella-related illnesses linked with tomatoes, jalapeno and serrano peppers). One of the largest recalls (over 3,400 products) this year is due to salmonellosis from peanut butter with over 680 people ill and 9 deaths

Tracking Foodborne Illnesses

Many foodborne illnesses don't get reported, and when they are reported, the information comes to the CDC from state, county and town health offices, often with incomplete data.

To address the problem of incomplete reporting, the CDC developed a system called FoodNet that actively surveys and obtains data from state departments, doctors, state health departments and more in 10 locations around the United States. Despite this improvement, FoodNet falls short in that it only collects data for 10 pathogens (such as *Campylobacter, Listeria monocytogenes, Salmonella, Vibrio* and certain parasites).

Data

In 2004 the Government Accountability Office conducted a study and estimated that seafood accounts for 15% of all foodborne illness outbreaks in U.S. This is a greater percentage than meat or poultry even though meat and poultry are consumed six times as frequently as seafood.

The NACMCF review of CDC data from 1998-2004 shows that a little over 11% of outbreaks and 5% of cases are due to seafood consumption. When the NACMCF reviewed all the outbreaks and cases caused by pathogens alone, only about 7% and 4%, respectively, were due to seafood consumption. This led the NACMCF to conclude that 72% of the seafood-related outbreaks were due to 3 causes:

- Ciguatoxin in tropical reef fish
- Pathogens in raw molluscan shellfish
- Scombrotoxin from mishandling and temperature abuse of species like tuna or mahi mahi

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I. Seafood Safety & Foodborne Illness – Quick Facts Continued

The culprits in seafood-borne illnesses are bacteria, chemicals (biotoxins), pathogens, parasites and viruses.

- 83% of outbreaks caused by chemicals are due to seafood
- 5.8% of outbreaks caused by bacteria are due to seafood

The CDC 2006 data reported 1,250 food outbreaks and over 25,000 cases. Only half of these outbreaks could be confirmed by linking a type of food to the illness, and of those confirmed (625 outbreaks), 10% were from seafood. For the other half of the 2006 outbreaks, the food source could not be determined.

So while foodborne illnesses will be difficult to eliminate entirely, the question that begs to be answered in the seafood industry is this: Is the fish always to blame?

While we might not know the answer, there are some obvious things everyone can do to ensure safe seafood:

- Keep hands and surfaces clean
- Keep products separate
- Chill properly
- Cook to proper temperatures

Known factors in contributing to foodborne illnesses from seafood include:

- Improper storage and holding temps
- Inadequate cooking
- Poor personal hygiene
- Cross contamination
- Improper reheating

Finally, there exists a delicate balance between overcooking and cooking to inactivate a pathogen and the data available is difficult to interpret due to the number of species in the industry. For example, there is a lack of thermal inactivation data for pathogens in seafood because there are so many products and cooking methods.

While the NACMCF has recommended that studies be done to continue to gather research, one can always turn to the FDA Food Code as a guide if the data needed is not available elsewhere.

Recommended cooking values from the FDA Food Code:

- 15 seconds at 145° F or above for fish
- 15 seconds at 155° F for comminuted fish
- 15 seconds at 165° F or above for stuffed fish

These are not magic numbers but somewhere to begin.

For more information on food safety and foodborne illness, visit www.FoodSafety.gov

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Best Practice Guide

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II. Cooking Seafood Safely

Source: Toni Manning, Director of Consulting, Eurofins Scientific, Inc.

There are few things more debilitating to your brand than a rumored seafood illness from your store or restaurant. While we rarely can prove the origin of foodborne illnesses and whether or not it originated with one of our products, we must always work with the customer, listen to their complaint and ask the right questions:

- What time was the onset of illness?
- What was the duration of illness?
- What were the symptoms?

With answers to these questions one is better equipped to target certain pathogens.

If the seafood you are selling is expected to be cooked by your customer, then you are relying on your customer to be the last kill step for your product and therefore the one responsible to render the product safe to eat. In this case, it is essential to make sure the cooking directions for your product are easy to find, easy to follow and explicit in their wording.

1. Best Practices for Cooking Instructions for Your Customers

- Use the FDA Food Code internal temperature guide to provide heating instructions for your product
- Measure the internal temperature by finding the cold spot which may differ based on product and cooking method
- The longer the cooking time the lower the internal temperature can to be to achieve the appropriate kill
- 165° F is the minimum for microwaved heating of all products
- A certain rate of pathogen destruction is determined (lethal rate curve) so as temperature rises, lethality rate goes up. In one example: the maximum temperature was reached after 4 minutes, but lethality continued into the 8 minute mark (past maximum temperature).



- Cooking temps and time will vary based on cooking type (microwave vs. oven)
- Specify standing time as products may not cool down all the way post-cooking

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- Include easy-to-follow clues to safe cooking (cook until bubbling, cook until crust is brown, etc.)
- Cooking directions may be determined by the space you have on your package be creative!

2. Selling Safely Cooked Seafood

To protect against selling cooked seafood with pathogens, there are several cautionary steps you can take:

- 1) Conduct a challenge study inoculating your product with a surrogate organism that mimics the properties of the target pathogen but is not pathogenic. Then cook the product according to the proposed directions and measure the number of organisms after cooking is complete.
- 2) Use a combination of ingredients that will allow you to heat your product to a lower temperature. You may need to provide proof to a regulatory or legal department that
 - Upper curve is 145° F (but at 154° you get a better kill)
 - Curve starts to flatten out at 154° F
 - Shrimp will have a reduction of bacteria in .07 minutes at 145° F, or in 4 seconds at 154° F. This rate was conducted in a lab, looking at a mashed sample of shrimp put in a bag of boiling water, which is one way to achieve a kill rate but does not apply for other commercial cooking methods such as sautéing or frying. (Source: Michael Jahncke, Ph.D, Virginia Tech)

For additional information on cooking seafood safely, contact Tori Manning, Eurofins Scientific, Inc., www.sas-labs.com

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