

ABSTRACTS

**CAN A HAZARD BE BOTH SAFETY AND NON-SAFETY IN A HACCP PLAN?**

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In the Food and Drug Administration's proposed mandatory HACCP for seafood processor and importers, parasites are considered as both a safety and non-safety hazard. If a supplier produces products that are sold as sushi grade; he should handle parasites as a safety hazard. The control measure suggested by FDA for parasites in seafood that are intended for raw consumption is freezing.

The Model Food Code requires that fish to be served raw be frozen to at least -20°C for seven days or blast frozen to -35°C for 35 hours. This recommendation is derived from data gathered from anisakine nematodes in a variety of hosts. The literature contains data that indicates that this treatment is adequate for other parasites and data that indicates the process may not be adequate for all platyhelminthes.

**FDA'S GULF COAST SEAFOOD LABORATORY:  
HISTORY, MISSION AND CURRENT RESEARCH**

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This Laboratory was established in 1963 as the Gulf Coast Shellfish Sanitation Research Center under the U.S. Public Health Service and focused on shellfish research. In 1973, it's name was changed to Gulf Coast Technical Services Unit with a new mission of providing technical assistance to support the National Shellfish Sanitation Program. In the early 1980's the role of the Laboratory in technical assistance was reduced and it's responsibility for finfish and shellfish safety research broadened. The Laboratory was named the Fishery Research Branch until it was placed under the newly organized FDA Office of Seafood in 1992. The Gulf Coast Seafood Laboratory's present mission is to conduct research that will support the implementation of the FDA HACCP program for seafoods. Focus is on identification, source and significance of hazards and on developing methods to detect hazards.

## AN OVERVIEW OF THE NMFS PRODUCT QUALITY AND SAFETY PROGRAM

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NMFS has four major laboratories concerned with seafood product quality and safety. These facilities are located in Gloucester, MA, Charleston, SC, Pascagoula, MS and Seattle, WA. With the exception of the NSIL facility in Pascagoula, MS which is solely dedicated to the National NMFS Inspection Program, the other facilities are fully integrated in the NMFS Fishery System of Habitat Protection, Environmental Contaminant Monitoring, Biotoxins, New Methods Development; Population Dynamics, and Aquaculture. Such Product Quality and Safety Laboratories bring an integrated fishery system approach to consumer protection and serve as available resource base to NSIL and the NMFS Inspection Program. The programs of each facility are integrated into supporting seafood inspection needs. To insure program integration, a National Seafood Product Quality and Safety "Tiger Team" coordinating is composed of each Product Quality and Safety Laboratory Director and the Directors of the Environmental Conservation Division and Inspection Services Division. The purpose of the "Tiger Team" is to annually plan, update, and implement a coordinated program of scientific research and services to meet both short and long term needs to the NMFS Inspection Program. All NSIL activities are integrated into this Product Quality Safety fishery support system. An overview of this program will be presented.

## NATIONAL MARINE FISHERIES SERVICE AQUACULTURE RESEARCH PLANS

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The National Marine Fisheries Service (NMFS) is preparing plans for new research on marine aquaculture at both the national and southern regional levels. Increases in research are dependent upon policy decisions and allocation of resources by the Agency. Within the region, impediment to aquaculture development have been identified by three mechanisms: (1) review on recently published analyses of the industry; (2) informal discussions with researchers and entrepreneurs in all southeastern states and the U.S. Caribbean; and (3) a workshop that included representatives from throughout the region covering a broad range of technical disciplines and experiences.

Workshop participants described a progressive industry and identified major obstacles to full realization of industry goals within ten years. Recommendations for NMFS involvement have been prepared that consider priority needs for the industry, the strengths and mission of the Agency, and close coordination with other agencies and industry.

## **RECENT CHANGES IN OYSTER CONSUMPTION AMONG FLORIDA RESIDENTS**

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A telephone survey was conducted during May and June of 1994 to determine current consumption levels of oysters and to ascertain changes in consumption behavior. The survey included 1,012 adults in seven metropolitan areas in north and central Florida. The study documents a continuing erosion of public confidence in the safety of oysters, largely fueled by adverse media publicity and consumption advisory notices.

## **EVALUATION OF ON-BOARD HANDLING TECHNIQUES ON THE QUALITY OF VARIOUS COASTAL HERRING SPECIES**

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The Gulf of Mexico contains one of the two major latent fishery resources in the U.S. This resource includes many species of fish which are small in size and have not been readily accessible by traditional fish locating and harvesting methods. As a result, very little information is available concerning proper methods to handle, hold, and process these fish. Information is also lacking on the effect of season and capture site on yield, sensory characteristics, proximate and fatty acid compositions. Data are presented on the effects of on-board storage on the quality of rough scad stored in ice, refrigerated seawater (RSW), or a 3% salt-ice mixture. The results of proximate, chemical and fatty acid analyses are also shown for rough scad, round scad, chub mackerel, silver rag, round herring, and harvest fish that were collected during two different seasons over a three-year period. This information supports development of expanded fisheries and value-added products utilizing the coastal herrings and associated species complex.

**STORAGE CHARACTERISTICS OF FROZEN BREADED POPCORN SHRIMP  
PACKAGED IN MODIFIED ATMOSPHERIC THERMOFORMED CONTAINERS  
AND HELD ON AN UPRIGHT DISPLAY CASE - A PRELIMINARY REPORT**

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Previous work by the authors has shown that temperature cycling in retail display freezers causes rapid deterioration in the quality of frozen breaded shrimp. The authors are investigating the effects of modified atmosphere packaging on the quality and shelf-life of frozen breaded popcorn shrimp held in an upright retail display freezer. Chemical, microbiological, physical and sensory changes in the shrimp were monitored during frozen storage between 3 and -18°C. The freezer has two defrost cycles per day and the doors are automatically opened every 15 minutes to simulate retail traffic. Popcorn shrimp were held in the following containers: (1) the current retail pack, a waxed carton containing a polyethylene bag; (2) a medium barrier clear thermoformed container with an air atmosphere; (3) high barrier clear thermoformed container with a CO<sub>2</sub> atmosphere; and (4) a medium barrier clear thermoformed container with a CO<sub>2</sub> atmosphere; and (5) a high barrier clear thermoformed container with a CO<sub>2</sub> atmosphere. Results from the first three months of retail storage will be presented. The following analyses were completed: (1) oxygen and CO<sub>2</sub> levels in the packages; (2) Hunter L, a, b, color values; (3) aerobic plate counts; (4) TBA levels; (5) free fatty acid levels and (6) odor, taste, and appearance analyses by a trained sensory panel.

## SEAFOOD HACCP ALLIANCE FOR EDUCATION AND TRAINING

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The National Sea Grant Program has recently funded a two-year proposal to support plans for a "Seafood HACCP Alliance" for training and education. This Alliance was initiated by the Association of Food and Drug Officials (AFDO) and their regional affiliate of Southern States (AFDOSS) in conjunction with a cadre of Sea Grant Specialist which originally assisted the National Fisheries Institute (NFI) with their initial HACCP training programs. The first formal alliance meeting, June 22-23, 1994 in Portland, ME, established a project "Steering Committee" largely based on the contributing authors for the original proposal. This Committee includes members representing the three principal federal agencies, Food & Drug Administration, U.S. Department of Agriculture, and the National Marine Fisheries Services, the various state agency organizations through AFDO regional affiliates and the Interstate Shellfish Sanitation Conference, and the industry trade associations, NFI and National Food Processors Association.

The proposed approach recognizes the essential role of state regulatory authorities, the educational network of Sea Grant and Cooperative Extension Services, and the need for regional attention per seafood diversity. The Alliance does not plan to set or recommend policy. Their primary role will rest with education and communication for a more uniform and technical assistance program for the seafood industry and federal, state and local food inspectors. They plan to instruct this dual audience in a more coordinated and mutual manner. Their plan is not intended to be exclusive. They recognize, encourage and plan to assist any related educational efforts be they private, institutional and/or of government base. Specific tasks proposed by the Alliance include preparing a Core Curriculum, preparing instructors, maintaining a 'Compendium' of methods and conducting some pilot-tests in commercial settings.

### PILOT-TESTING HACCP FOR OYSTER PROCESSING

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In response to the FDA's pending mandatory Hazard Analysis and Critical Control Point inspection program, HACCP pilot-tests are under investigation for the processing of oysters, (Crassostera virginica) in Apalachicola, FL and Houma, LA. The initial USDA extension service/aquaculture project combined State regulatory and industry experience by which to judge the most appropriate HACCP plan relative to product safety, and practical monitoring and recordkeeping procedure.

The pilot HACCP plans include two critical control points, receiving and storage; plus a routine sanitation program with periodic and continuous monitoring procedures. After initial in-plant trial to refine the recordkeeping requirements, the commercial operation has continued conducting actual processing under the recommended HACCP program. During this period the firm was inspected by the pertinent State authorities utilizing both the HACCP and the traditional inspection modes. The combined results reflect on the commercial and regulatory perspectives on HACCP for oyster processing.

## **OPTIMUM CONDITIONS FOR THE PREPARATION OF DEHYDRATED QUICK SALTED FISH CAKE (DQSFC)**

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A modified quick salting technique, consisting of filleting, grinding, quick salting, mixing, presenting at  $150 \text{ Kg/cm}^2$  for 1.35 minutes and sun drying was carried out to preserve Bolti and Karmout fish in a form of a product which would have longer shelf-life at ambient temperature. To evaluate the benefits of this process, physical properties and sensory quality of the finished product were assessed. Chilled fish samples (3 days at  $+4^\circ\text{C}$ ) frozen samples (one month at  $-18^\circ\text{C}$ ) were used.

Minimum salt-to-fish ratios for optimum fish cake forming were 90%, 85%, 75% and 70% for chilled bolti, frozen bolti, chilled karmout and frozen karmout, respectively. Pressing was found to be the most important step which determined the optimum fish cake forming. Salting process increased the yield of the ground fish by approximately 2 folds in a samples. The initial values of the fresh fillets were attained by desalting in water for about 24 hrs. Drying period required for optimum moisture content were 17, 16, 13, and 8 hrs. for chilled bolti, frozen bolti, chilled karmout and frozen karmout respectively. Sensory evaluation showed that the finished product was completely coherent, compact and stable at room temperature. Desalted fish cake was quite acceptable with various cooking methods.

## **USE OF CHLORINE DIOXIDE, PEROXIDES, ALKALINE AGENTS AND ORGANIC ACIDS ON A CHANNEL CATFISH PRODUCT**

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Psychotropic plate counts (PPC) of channel catfish (CC) steaks treated with 25 to 50 ppm chlorine (CL) or chlorine dioxide (CLO) rose from 4.45 log CFU/g to 6.75 log CFU/g after 10 d at  $3^\circ\text{C}$ . CC nuggets dipped in 50-100 ppm CL or 1-2% NaOH, sodium percarbonate (SPC), peroxyacetic acid (PAA), and NaOH/Acetic acid (NAA) for 20 min. at  $2^\circ\text{C}$ . NaOH at 2% showed the highest inhibition while PAA and NAA were equally effective at 1 or 2%, and SPC was as effective as CL. SPC and CL reduced PPC by one log CFU/g whereas the others reduced it by 2-2.5 logCFU/g. Most treatments increased Hunter L values of the products by four to eight units, but these tended to equilibrate over storage. Hunter a values did not change but Hunter b values decreased by one or two units on NaOH and PAA treated samples. Sensory Panelist rated all samples equally in appearance, and no different than the control. It was found that the sanitizers tested were effective in reducing PPC in CC products and did not have significant effect on the product's appearance.

## PACU - AN AQUACULTURE ALTERNATE

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The Amazonian Pacu is a fast growing, hearty fish that may be a good candidate for aquaculture. Pacu eat a variety of foods, display rapid growth rates and can thrive in conditions unsuitable for other fish. Pacu obtain weights of about 20 Kg in the wild and seem to be disease resistant. There are three species of genus Colossoma native to South America. The primary candidate species for aquaculture is C. Brachynomum. This species is dark grey to silver dorsally with hues of an orange to pink breast. They were originally transported to southern Florida by ornamental fish culturist, but interest in the fish as a food source is growing.

Several entrepreneurs are experimenting with growing Pacu and are finding the fish easy to grow, cheap to feed, and delicious to eat. Researchers have found the fish to be very meaty, much easier to fillet than tilapia and one does not have to scale the skin. It is compared favorably to opal (moonfish): firm textured, white meat and lean.

Some concerns have evolved with farming pacu. They are not cold-hardy and require water temperatures above 24°C for best growth. Females in the genus Collosmid will not propagate naturally in Florida and must be given a hormone that causes them to release eggs. The edible portion of the pacu fillets contain small forked, intramuscular bones that must be removed or softened. Despite these concerns, it is believed by many that this large, fast-growing and excellent eating freshwater fish can be successfully **marketed** in the U.S.