Welcome to the 55th Annual Meeting of the Pacific Fisheries Technologists! 2004 PFT Meeting

The purpose of the Pacific Fisheries Technologists organization is to provide a medium of exchange for technical and scientific information among fisheries technologists, and those interested in fisheries technology, by holding meetings for the presentation of papers and discussions of technical scientific matters relating to the fisheries industries and to collaborate with research institutes, universities, and governmental agencies engaged in fisheries work.
For this years meeting, the paper and poster presentations that have been selected reflect this year's theme: "Fish is Delicious and Nutritious"

This year, we are doing something a little different, we have brought together academia & industry members (from fishermen to Marketers) as panelists to share and discuss what they are doing in research and "in practice" to help produce products that people will want to eat…again and again…and will benefit their health.

We are very pleased to announce that we have 15 student presentations! This should lead to an exciting contest. Good luck to all of you Students!

For our banquet, Tuesday evening, we will have a speaker from Alaska Airlines Cargo division that we hope you will find informative as well as entertaining!

Contributions from the below sponsors helped make this event possible:

Alaska Seafood Marketing Institute, John West Foods, Clover Leaf / Bumble Bee Seafoods, Crowley Marine, Crown Cork and Seal, Labeling Services Inc., Mr. Charlie Baggs, The National Food Processors Association, North Pacific Processors, Ocean Beauty Seafoods, Pacific Seafoods Group, Peter Pan Seafoods, Roquette and Zep Chemicals.

SPONSORS, THANK YOU FOR YOUR SUPPORT!

Also, please help us thank Hart Schwarzenbach of Peter Pan Seafoods for dedicating his time and effort to get these sponsors for PFT!

DOOR PRIZE DRAWINGS

We will be handing out tickets as you enter the meeting room on **Monday, Tuesday and Wednesday morning** for door prize drawings. **Only one ticket per day** will be given to each person and you must be present to win. **GOOD LUCK!**

Federal Way High School JAZZ Band

The Banquet this year will feature Jazz Combo music presented by the Federal Way High School Band.

This Band has been selected to perform in a four-day "*Tribute to a Generation"* dedication celebration planned by the American Battle Monuments Commission in Washington DC!

During the performance, the band will be accepting cash donations to help sponsor this trip. A donation jar will be provided. Any donation you can give would be most appreciated.

Thank you for taking the time to read the above information!

2004 PFT Meeting Schedule

(casual dress for all events please)

Sunday, February 29th, 2004

CHAPS LOBBY	6pm – 7 pm	Registration, *Hosted by NFPA NW Laboratory*

FLIGHT ROOM	6:30 – 7 pm	**PFT Executive Committee Meeting**
CHAPS ROOM	7 pm – 9 pm	**PFT Presidents Reception**
		Welcome
BRING MONEY, NO HOST BAR!		George Berkompas, *NFPA, PFT President*
		Opening Remarks
		Dr. Rhona Applebaum, *NFPA*
FLIGHT ROOM	9 pm - ??	**PFT HOSPITALITY SUITE**

Monday, March 1st, 2004 *There will be one break mid-morning and mid-afternoon.*

CHAPS LOBBY	Open all day	Registration, H*osted by NFPA NW Laboratory*
CHAPS ROOM	7 am - 8 am	Full Breakfast (provided with full registration)
SATELLITE ROOM	8:30 am	**Welcome**
		George Berkompas, *NFPA, PFT President*
		Opening Remarks
		Ed Kolbe, *OSU Food Innovation Center*
		Door Prize Drawing
		Hart Schwarzenbach, *PPSF*
	9 am - Noon	**Resource/Utilization Presentations**
		Pete Nicklason - Introductions, *PFT Treasurer*
		Presentation
		Wally Pereyra, *Chairman, Arctic Storm Management Group. LLC*
		Trypsin activity regulation and expression in penaeids
		Andriana Nuhlia-Almazan, *CIBNOR - Student*
		Value added through QC of longline catch.
		S. Fredrik Sverre, *M.Sc., R.P.Bio*
		Feces as a source of enzymes and a tool for biochemical…
		Fernando García-Carreño, *CIBNOR*
		Partial characterization of digestive proteases in bluefin...
		Z. Essed, *CIBNOR - Student*
		Characterization and in vitro protein hydrolysis by stomach...
		Carmen M. de Ona Baquero, *Almeria University (Spain) - Student*
		Occurrence of Vibrio parahaemolyticus in Oregon and Washington…
		Jingyun Duan, *OSU Seafood Lab - Student*
		Resource/Utilization Panel
		Pete Nicklason - Chair, *PFT Treasurer*
CHAPS ROOM	Noon - 1 pm	Lunch (provided with full registration)
Musical Entertainment provided by John "van Am" van Amerongen		
SATELLITE ROOM	1 pm - 5 pm	Door Prize Drawing
		Hart Schwarzenbach, *PPSF*
		Harvesting through Processing Presentations
		Liz Brown - Introductions, *U of Alaska, Marine Advisory Program*
		Electrolyzed oxidizing water as a sanitizer for inactivating LM…
		Chengchu Liu, *College of F.S.&T., Shanghai Fisheries University China*

Monday, March 1st, 2004 *There will be one break mid-morning and mid-afternoon.*

		Filth in shrimp
		Hans K. Loechelt-Yoshioka, *FDA*
		Investigation of protein structural changes in alkali-treated fish...
		Supawan Thawornchinsombut *OSU Seafood Lab - Doctoral student*
		'Time and Temperature and What They Do To Fish'
		Jim Barnett, *FDA*
		Use of high temperature resistant packaging on frozen red…
		Ezquerra-Brauer Josafat Marina *Universidad de Sonora - Student*

		Evaluation of a chromogenic medium for detecting Vibrio parahaemolyticus Yi-Cheng Su, *OSU Seafood Lab* *Inactivation of Listeria inoculate in Minced Trout Using High Hy…* Nese Basaran *Washington State University - PhD Student* **Harvesting through Processing Panel** Liz Brown- Chair, *University of Alaska Marine Advisory Program* ***SPECIAL POSTER** - The Community Seafood Initiative (CSI)* Diane Moody, *Shorebank Enterprise Pacific*
MEET IN LOBBY	10 am - 3 pm	(Guest Program)
FLIGHT ROOM	6 pm - ??	**PFT HOSPITALITY SUITE**

Tuesday, March 2nd, 2004 There will be one break mid-morning and mid-afternoon.

CHAPS LOBBY	Open all day	Registration, *Hosted by NFPA NW Laboratory*
CHAPS ROOM	7 am – 8 am	Full Breakfast (provided with full registration)
SATELLITE ROOM	8:30 am – Noon	Door Prize Drawing Hart Schwarzenbach, *PPSF* **Retail/Marketing Presentations** Lucina Lampila – Introductions, *Albright & Wilson Americas* *A survey on the seafood consumption and marketing in Turkey* Sevim KOSE, *Black Sea Tech. University* *Seafood Information for Consumers…* Pete Granger, *Washington Sea Grant* *Seafood Allergens* Jupiter Yeung, *NFPA* *Progress report on the AQS program* Stephen T. (Steve) Grabacki *AQSP* *Listeria contamination patterns and control strategies in smoke…* Ken Gall, *AFDO Cornell University* **Retail/Marketing Panel** Lucina Lampila – Chair, *Albright & Wilson Americas*
CHAPS ROOM	Noon – 1 pm	Lunch (provided with full registration)
SATELLITE ROOM	1 pm – 5 pm	Door Prize Drawing Hart Schwarzenbach, *PPSF* **Nutrition/Chefs Presentations** Sandra Stark – Introductions, *QA Manager AquaStar* *Omega-3s: Are they all created equal?* Cindy Snyder, *MPH, RD, National Nutrition Services* *Advances in omega-3 fatty acids and heart health* Joyce Nettleton, *ScienceVoice Consulting & ASMI*

Tuesday, March 2nd, 2004 There will be one break mid-morning and mid-afternoon.

		Seafood & Helpful Diets: The future looks bright for claims and dietary… Robert Earl, *NFPA* *Carbs – they're not all bad!* Pam Vaillancourt, *Director of Technical Sales, TIC Gums, Inc* *What it takes to build a quality product* Bret Lynch, *Corporate Executive Chef, Charlie Baggs, Inc* *Differences in omega 3 fatty acids in Alaska chum and sockeye* Chuck Crapo, *University of Alaska, FITC* **Nutrition/Chefs Panel** Sandra Stark – Chair, *QA Manager AquaStar*
MEET IN LOBBY	10 am – 3 pm	(Guest Program)
SATELLITE ROOM	5 pm – 5:30 pm	**PFT Business Meeting**
SATELLITE ROOM	5:30 pm – 6:30 pm	**Poster Session**

		Isolation and Characterization of Trypsin… Francisco Javier Castillo Yañez. *Univer de Sonora,Ph.D. Student* *Frozen storage of fish proteins as affected by…..* Angee Hunt *OSU Seafood Lab – Student* *The effect of processing techniques…to its quality* Sevim KOSE, *Black Sea Tech. University* *Fatty Acid Composition and Differential Scanning Calorimetry…* Ezquerra-Brauer Josafat Marina, *Universidad de Sonora – Student* *Omega-3 polyunsaturated fatty acid concentrate from sardine…* Tomoko Okada, *OSU Seafood Lab – Doctoral Student* *The Culinology® Framework for food product development…* Sergio F. Almonacid, *OSU Seafood Lab – Ph.D. graduate student* *Effects of freezing-thawing in melanization, composition of…* Díaz-Tenorio LM, *CIBNOR – Student* *On-Board Handling Techniques for Albacore Tuna…* Michael Thompson, *OSU – Master graduate student* *Properties of Protein Powders from Pollock Byproducts* Subramaniam Sathivel, *University of Alaska FITC* *Physical, Texture and mictrostructural ..* Ana Isabel Beltran Lugo, *CIBNOR – Doctoral Student* *Mercury Content in West Coast Troll-Caught Albacore Tuna…* Michael T. Morrissey, *OSU Seafood Lab* *Characterization of Acidic Proteolytic Enzymes…* Francisco Javier Castillo Yañez, *Univer de Sonora – Ph.D. Student*
CHAPS ROOM *BRING MONEY TO DONATE TO THE BAND!*	6:30 pm – 7 pm	**Reception** *Jazz Combo Music* – Presented by Federal Way High School
CHAPS ROOM	7 pm – 9 pm	**PFT Banquet** *Alaska Airlines*
FLIGHT ROOM	9 pm - ??	**PFT HOSPITALITY SUITE**

Wednesday, March 3rd, 2004 *There will be one break mid-morning.*

CHAPS LOBBY	Open till Noon	Registration, *Hosted by NFPA NW Laboratory*
CHAPS ROOM	7 am - 8 am	Continental Breakfast (provided with full registration)
SATELLITE ROOM	8:30 am - 11:30 am	Door Prize Drawing Hart Schwarzenbach, *PPSF* **Regulatory Updates** John Clemence - Chair, *FDA* *America* Charles Breen, *FDA* *Canada* Richard Grant, *CFIA* *Mexico* **USDC Update** Mr. Roxy Triplett, *WIB* *Washington State* Will Satak, *WA Department of Agriculture* *Oregon State* Bob Gerding, *Oregon Department of Agriculture* **Common Mistakes in HACCP** Liz Brown, *University of Alaska Marine Advisory Program* **FDA Prior Notice Update Panel** **Regulatory Panel** John Clemence - Chair, *FDA*
	11:30 am - Noon	**2004 scholarship awards** Don Kramer, *University of Alaska MAP* **PFT Closing Remarks** George Berkompas, *NFPA, PFT President*
	Noon - 1 pm	Lunch (not provided)
MEET IN LOBBY	1 pm - 3 pm	**PFT Field Trip** Hart Schwarzenbach, *PPSF*

Resource / Utilization Presentations

Pete Nicklason – Chair

Presentation

Wally Pereyra

Trypsin activity regulation and expression in penaeids

*__Muhlia-Almazán A__. Sainz JC. Navarrete del Toro MA. García-Carreño FL. CIBNOR. PO Box 128, La Paz, B.C.S. 23000, Mexico. Fax +52 612 125 3625. fgarcia@cibnor.mx

Trypsin activity in the digestive gland of penaeids is composed of three isotrypsins. All trypsin activity is influenced by several variables, including molting stage, nutritional status, and feed composition. We found that organisms fed feed containing 30% protein had the highest trypsin and chymotrypsin activity when compared with organisms fed feed containing 15 or 50% protein. A correlation between trypsin activity and concentration of mRNA for trypsin was found. This information suggests that trypsin enzymes in penaeids are regulated during transcription. Also, we found that the three isotrypsins segregate according to Mendelian rules. Isotrypsins A, B, and C form three phenotypes that are dependent on two loci: locus α, which is homozygous and yields isoform C, and locus β, yielding isoforms A and B. External or internal stimuli does not affect the phenotype and differences in trypsin activity among groups fed different feed regimes are related to changes in the relative proportion of the three isotrypsins.

Value added through quality control of longline catch

Author**:** **S. F. Sverre***, M.Sc., R.P.Bio., President, ENTECH CONSULTANTS CORP., West Vancouver, BC

The objective of the oral presentation is to give an example of how quality control from the time the fish is caught, contained, and transported to the fish processing plant and to it reaches the retailer/consumer can lead to greater value and appreciation by customers.
An overview will be provided of the many steps needed to ensure highest quality and customer satisfaction that leads

to strong demand and increased value. The power point presentation will provide factual information that will be of value for everybody involved from the fishing vessel owners, crew and processors and the people involved in the distribution network.
We will give an example of how our clients achieve repayment of capital costs in the short term including consulting fees and increased profit.
Our hope is that the fishing industry will continue to be innovative and invest in the future to ensure a healthy profit and a secure future for the people involved in our industry.

Feces as a source of enzymes and a tool for biochemical, physiological, ecological, and aquafarming studies

*__García-Carreño FL__. Navarrete del Toro MA. Córdova Murueta J.
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Feces from shrimp, Penaeus vannamei, were analyzed as a source of digestive enzymes. A perfect match between the composition of enzymes from the digestive gland and from feces was found. Trypsin and chymotrypsin paralogues were identified by substrate electrophoresis.
Organisms were challenged by feeding them with one of three feed regimes. Changes in the activity and composition of proteases in the digestive gland were mirrored in samples of feces, although enzyme activities were always higher in the digestive gland than in feces. However, when enzymes from feces were used to digest a standard protein, this source yielded a higher degree of hydrolysis than enzymes from the digestive gland.
Enzymes secreted by digestive gland cells into the lumen of the organ mix with food and transported with the digested remains of the food through the intestine. The enzymes found in feces are fully active. Therefore, feces are a suitable way to sample digestive proteases in marine organisms to evaluate biochemical, physiological, ecological, and aquafarming studies.

Partial characterization of digestive proteases in bluefin tuna (Thunnus thynnus)

Essed, Z., Alarcón, F.J., Díaz, M., Moyano, F.J and García-Carreño, F.L.
Dpto. Biología Aplicada, Universidad de Almería, 04120, Almería, Spain.
[1]Centro de Investigaciones Biológicas del Noroeste (CIBNOR), Apartado Postal 128, B.C.S. 23000 La Paz, México.

ABSTRACT
The digestive proteases of bluefin tuna were studied. Protease activity in stomach extracts showed two peaks at pH 2,0 and 3,5. Optimun activity for intestinal proteases was found at pH 10,0 and 12,0. Protease activity in stomach extracts were stable at several pH, except for pH 12,0. Alkaline protease activity of intestine extracts was found highly sensitive to acidic pH. Temperature optimums were found at 50 ºC and 60ºC for acid and alkaline proteases. The use of s protease inhibitors confirmed the presence of acid proteases in stomach extracts and serine proteases in intesti extracts. SDS-PAGE allowed identification of active fractions in extracts.

Characterization and in vitro protein hydrolysis by stomach proteases of common dentex (Dentex dentex), red porgy (Pagrus pagrus) and the hybrid Dentex x Pagrus.

De Oña, C.M., Alarcón, F.J., Díaz, M.E. Abellán1 y García-Carreño, F.L2.
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2 Centro de Investigaciones Biológicas del Noroeste (CIBNOR), Apartado Postal 128, B.C.S. 23000 La Paz, México.

ABSTRACT
Characterization and comparison of acid proteases in stomach extracts of common dentex (Dentex dentex), red porgy (Pagrus pagrus) and the hybrid of both species (Dentex (female) x Pagrus (male)) was carried out using biochemical and electrophoretical techniques. Acid proteases showed their peak of activity between pHs of 2.0 and 3.5. The temperature optimum for the three extracts was 37 ºC. The inhibition of acid protease activity by Pepstatin A confirmed the presence of aspartics proteases in the stomach secretions of the three sparids. Zymograms showed a combination of parental enzymes in hybrid stomach extracts, yet with predominance of Dentex dentex isoforms. Results indicate that the hybrid Dentex x Pagrus shows a more
complex stomach proteases than its parental species. The degree of hydrolysis of four proteins by acid enzymes of the three organisms was also compared. This comparative study was carried out by the determination of the following parameters of protein hydrolysis; the degree of hydrolysis by the pH-stat system, the quantification of amino acids

released along the hydrolysis and a sequential study of the products by SDS-PAGE.

Occurrence of Vibrio parahaemolyticus in Oregon and Washington oyster farms

Jingyun Duan* and Yi-Cheng Su
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Abstract

The occurrence of *Vibrio parahaemolyticus* in Oregon and Washington oyster farms was investigated to provide microbial risk assessment on consuming oysters produced in the region. Seawater, sediment, and oyster were collected from three oyster farms in Oregon and Washington between November 2002 and October 2003. Densities of *V. parahaemolyticus* in samples were determined by most probable number (MPN) method and multiplex polymerase chain reaction (PCR) targeting *tl*, *tdh*, and *trh* genes.

Among the 252 samples tested, 26.2% were positive for *V. parahaemolyticus*. However, only 13.5% of total samples were contaminated with pathogenic *V. parahaemolyticus* at low levels of < 43 MPN/g. The occurrence of *V. parahaemolyticus* appeared to be related to water temperatures. Approximate 73% of *Vibrio*-containing samples were collected when water temperatures were higher than 15°C. There was no apparent correlation between the occurrence of *V. parahaemolyticus* and water salinity.

This study showed a low risk of consuming raw oysters produced in Oregon and Washington. However, the risk may increase when water temperature arises especially during summer months. Freshly harvested oysters should cooled down rapidly and stored at refrigeration temperatures until consumption.

Resource / Utilization PANEL

Pete Nicklason - Chair
Wally Pereyra
S. Fredrik Sverre, M.Sc., R.P.Bio
Linda Nageotte-Food Lifeline
Harold Barnett

PANEL SUMMARY

Utilization is money. Marine and aquatic products are protein, oil, and minerals. Processing to value add
and efficient methods to maximize yield and reduce costs are just as important in the seafood industry as any other processing business. To maximize the value of marine proteins, oils, and minerals requires not only good science but, marketing, business and finance, and regulation. Regulation can be standards and safety of new products to harvesting seasons, methods, and catch limits. The Eastern Pacific is the last developed fishing frontier. How can innovation be applied to Pacific fisheries to increase value and maintain economic health for this industry?

Harvesting through Processing Presentations

Liz Brown - Chair

Electrolyzed oxidizing water as a sanitizer for inactivating Listeria monocytogenes on seafood processing surfaces

Chengchu Liu[1]*, Jingyun Duan[2] and Yi-Cheng Su[2]

[1] College of Food Science and Technology, Shanghai Fisheries University, 334 Jungong Road, Shanghai, 200090, P.R.China

[2] OSU Seafood Laboratory, Oregon State University, 2001 Marine Drive, Room 253, Astoria, OR 97103, U.S.A.

Presence of *Listeria monocytogenes* in seafood processing plants is a main source of contamination for ready-to-eat seafood products. This study investigated the efficacy of electrolyzed water (EO water) as a sanitizer for inactivating *L. monocytogenes* cells on seafood processing surfaces. Stainless steel chips (5×5 cm^2) with or without crabmeat residue (clean or dirty) were contaminated with *L. monocytogenes* culture cocktail (10^6 cells/chip) and allowed to dry at room temperature for 1 hr. Inoculated chips were soaked individually in tap water or EO water for 5 min followed by rinsing in phosphate buffered solution for 1 min. *Listeria* populations on chips were determined before and after treatments. Dipping contaminated chips in tap water resulte about 1.0-log reduction of *L. monocytogenes* on both clean and dirty chips. However, treatments with EO water (pH2.4, ORP of 1150mv, chlorine concentration of 50 mg/L) yielded > 4.0-log reduction on the clean chips and near 3.0-log reduction on the dirty chips. A treatment of EO water with increased chlorine content (90 mg/L) increased the reduction (3.5-log reduction) of *L. monocytogenes* cells on the dirty chips. This study showed that EO water was very effective in inactivating *L. monocytogenes* and could be used as a sanitizer for reducing *L. monocytogenes* contamination on seafood processing surfaces.

Filth in Shrimp

Hans Loechelt-Yoshioka
U.S.Food and Drug Admin. (FDA)
PRL/NW

Abstract

This presentation will address **Sec. 402(A)(3)** defined as “Foods are deemed to be adulterated if they consist in whole or in part of any filthy, putrid, or decomposed substance”.

As **Import Alert 16-21**
or “Filth in Imported Fresh or Frozen Raw Shrimp” demonstrates, FDA has clearly defined methods for filth analysis.

These FDA methods for filth analysis and how they relate to Shrimp will be presented in this power point presentation.

Investigation of protein structural changes in alkali-treated fish proteins using Raman spectroscopy

S. Thawornchinsombut1*, J.W. Park1, G. Meng2, and E.C.Y. Li-Chan2
1 OSU
Seafood Lab & Dept. of Food Science and Technology, Oregon State University, 2001 Marine Drive, Suite #253, Astoria, OR 97103.
2 Food, Nutrition and Health program, The University of British Columbia, 6650 NW Marine Drive, Vancouver, BC, CANADA V6T 1Z4

Relationships between Raman spectra and protein structures have been used in the spectral analysis. Changes in protein functionalities, which cannot be differentiated by other methods due to the opaque or solid nature of many foods, are amenable to Raman spectroscopy.

Our objective was to measure the stability of alkali-treated proteins and conventional surimi (CS) at various storage conditions using Raman spectroscopy.

Rockfish mince were solubilized at pH 11 and subsequently recovered at pH 5.5. Two pH levels (5.5 and 7.0) were applied to this recovered pellet, which were further subdivided into two cryoprotectant treatments (0 and 8%). Samples were subjected to 3 freeze-thaw cycles including the conventional rockfish surimi (CS). One set of samples containing cryoprotectants was stored (–80°C) without freeze/thaw. All samples were adjusted to maintain equal pH (7) and cryoprotectants before gel preparation (78.5% moisture, 0% salt except for the CS (2%)). Raman spectral and texture

analysis were performed.

No significant textural difference was noted between samples stored at pH 5.5 and 7.0. Highest texture was found for samples frozen at pH 5.5 and 7 with cryoprotectants and CS, while lowest texture was observed for those frozen/thawed without cryoprotectants.
Raman spectral analysis demonstrated that refolding of alkali-treated proteins by pH adjustment to 7.0 was achieved, but not completely. CS showed higher ?–helix content (~50%) than alkali-treated proteins (~20-30%) after frozen storage.

Alkali-treated proteins were slightly less stable than CS during frozen storage. Chemically unfolded proteins, if frozen without cryoprotectants, were not fully refolded.
Raman spectroscopy is a potential tool to study protein structural changes under various storage conditions.

'Time and Temperature and What They Do To Fish'

Jim Barnett
U.S.Food and Drug Admin. (FDA)
PRL/NW

Use of high temperature resistant packaging on frozen red snapper fillets.

Dorado-Rodelo José Angel (1), **Ezquerra-Brauer Josafat Marina**(1) and Soto-Valdez Herlinda (2)

(1) Universidad de Sonora. Departamento de Investigación y Posgrado en Alimentos.
Blvd. Rosales y Encinas s/n. Tel: 01-662 259 22 08. Hermosillo, Sonora. México.
(2) Centro de Investigación en Alimentación y Desarrollo-Hermosillo, Sonora. México.
Presentation: oral
Topic: Processing/Storage

Two high temperature resistant plastics were evaluated as frozen red snapper packaging. Fillets of red snapper placed in the two different kinds of plastics, PA and PE, were kept at –20°C. Bacteriological counts, chemical, surface pH, water retention capacity (WRC) and trimethilamyne (TMA), texture (shear force), and sensorial analysis were carried out after 30, 60, 90 and 120 days of storage. The pH, TMA and WRC in both products packed were kept between acceptance limits. Fillets packed on PE lost more firmness and were below the limit of acceptability at the 30 days of storage. PA fillets were not rejected until the 90 days of the storage. The best product was obtained using PA as packaging.

Evaluation of a chromogenic medium for detecting Vibrio parahaemolyticus

Jingyun Duan and **Yi-Cheng Su***
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Abstract

The thiosulfate-citrate-bilesalts–sucrose (TCBS) medium commonly used in detecting Vibrio parahaemolyticus cannot differentiate V. parahaemolyticus from other Vibrio species such as V. vulnificus, V. mimicus, and V. harveyi. Suspicious colonies grown on TCBS
plates need to be analyzed with lengthy biochemical tests and results may not be available for 5 to 8 days. This study evaluated a new chromogenic medium (Bio-Chrome Vibrio medium) for detecting V. parahaemolyticus based on purple colony formation on the medium. A total of 221 bacteria including several Vibrio species were tested. Enriched cultures were streaked onto both Bio-Chrome Vibrio medium (BCVM) and TCBS plates and examined for color production after 20-24 hr of incubation at 37oC. Among the 148 V. parahaemolyticus strains tested, 145 strains produced purple colonies on BCVM. No purple colonies were produced by growth of other Vibrio species including V. vulnificus, V. mimicus, V. cholerae, V. hollisae, V. alginolyticus, and V. furnissii. Growth of Salmonella, Shigella, Escherichia coli, and Yersinia was inhibited by both BCVM and TCBS. These results indicated that BCVM was able to differentiate growth of

V. parahaemolyticus from other species and could be used with TCBS for V. parahaemolyticus detection to reduce biochemical confirmation tests.

Inactivation of Listeria innocua in Minced Trout Using High Hydrostatic Pressure

N. BASARAN*, M. Mousavi-Hasery and B. Rasco
Department of Food Science and Human Nutrition, Washington State University,
Pullman, WA 99164

The topic is related to Seafood Safety and also Seafood Processing Technology.

Abstract:

Listeria monocytogenes is an important human pathogen that has emerged as a major foodborne pathogen starting in the 1980s. It continuously poses a serious threat to food safety. The bacterium is the etiologic agent of listeriosis, a deadly disease, with 20-30% mortality, in-spite of antibacterial therapy, that affect mostly immunocompromised patients and pregnant women. The foods most commonly implicated in listeriosis, are soft cheeses, dairy products, fish products, salads and many other refrigerated 'ready-to-eat' products.
The objective of this study was to determine the effectiveness of high hydrostatic pressure (HHP) for the inactivation of Listeria monocytogenes in studies with the surrogate, Listeria innocua, in minced trout containing 0, 1, 3% salt. Fish samples were prepared and inoculated with three different strains of Listeria monocytogenes at 108 -109 CFU/ml. Listeria spp inoculated fish samples were treated at 150, 207, 296, 345, 400, 414, 448, 517 MPa at ambient temperature. The log reduction for each treatment and strain of pathogen was determined. The HHP death kinetics was determined for each of the three strains. HHP treatment at 414 MPa achieved greater than a 4-log reduction for all three Listeria innocua
strains tested in minced trout. There was no significant difference in the level of reduction as a function of salt concentration. This study indicates that high hydrostatic pressure treatment of minced trout could be an effective nonthermal processing method for fish and may be a suitable treatment for ready-to-eat products.

Harvesting through Processing PANEL

Liz Brown – Chair
Kate Abraham
Lisa Goche
Chuck Crapo
Jermaine from Red Lobster

PANEL SUMMARY

Repeat seafood consumers expect quality and safety. Supplying "delicious and nutritious" fish requires more effort than many other foods to maintain freshness, safety, and shelf life. The low temperature environment from which many Pacific species are harvested greatly influences the chemical and spoilage processes important to quality. The harvesting and processing section presents interesting topics that
illustrate the diverse technologies needed to understand and produce safe and valuable seafood.

SPECIAL POSTER PRESENTATION **- value-added products, economic development**

The Community Seafood Initiative (CSI)

Diane Moody, Shorebank Enterprise Pacific, Ilwaco, WA and Michael T. Morrissey, Oregon State University Seafood Laboratory, Astoria, OR

The Community Seafood Initiative (CSI) is a joint project between Oregon State University Seafood Laboratory, Shorebank

Enterprise Pacific, (a non-profit Pacific Northwest Development Bank), and the Consumer Seafood Center. Its mission is to foster successful entrepreneurship and coastal community development in the Pacific Northwest. This unique partnership mergers research, extension, and business and community development in order to strategically "bridge the divide" between coastal communities and knowledge-based institutions. The specific focus of the CSI project is to help coastal communities develop new seafood products and markets while developing and promoting sustainable aquaculture and fishing management practices. CSI has numerous sub projects and activities including developing new value-added seafood products, "virtually" integrating marketing, processing, and fishing activities, developing systems to optimally manage product quality, designing digital-based "traceability" systems for market and business development, and helping fishermen use and record environmental information to improve sustainable fishing practices. Besides conducting applied research in food science, marketing, and economics, the project sponsors numerous workshops and conferences, and works one-on-one with individual fishermen, processors, and marketers.

Retail / Marketing Presentations

Lucina Lampila – Chair

A survey on the seafood consumption and marketing in Turkey

Sevim KOSE Hamdi Ogut

In Turkey, seafood consumption is carried out mainly as fresh and also consumption is very low as around 8 kg/year/person. Although seafood marketing for export has been carried out in high standards for the past five years due to strict EU
regulations or other legislations for exports, marketing for domestic consumption is not up to acceptable standards yet. In this research, a marketing survey was carried out mainly based on Northeast of Black sea region in comparison with other regions in order to analyze consumer preferences. The questions were related to amount and the frequency of seafood consumption, the type of seafood preferred, health benefits of seafood and the effect of advertising on buying. The reasons for low seafood consumption as well as consumer opinion on the quality and price of marketed products were also investigated.
Collected data was analyzed and discussed according to region, age, income and the education of people.

"Seafood Information for Consumers: is it time for a neutral body to provide science-based information on seafo

Pete Granger
Program Leader
Marine Advisory Services
Washington Sea Grant Program
Seattle

This presentation will give an overview of the current state of seafood consumer education as it relates to health and envi Who supplies what information? How information is skewed to present a certain viewpoint. Both the seafood industry an

Seafood Allergens

Jupiter M. Yeung, Ph.D.
National Food Processors Association
Washington, DC

Abstract

Americans are consuming more fish and seafood than ever. Seafood is high in protein and low in fat. It is hard to imagine that eating something so nutritious and tasty can cause a major health problem for some people. Unfortunately, for a small percentage of people consuming even minute amount of seafood, no matter how it is prepared, can trigger allergic reactions. For those with exquisite sensitivity, anaphylaxis may occur. Severe anaphylactic shock can be fatal if not treated immediately.

As seafood becomes more popular, there have been increasing reports of "adverse reactions" to these foods. Adverse

reactions following exposure to seafood can result, not only from the seafood allergen itself, but it can also derive from naturally occurring seafood toxins, scombroid fish poisoning, bacterial or viral contamination, and chemical additives. Unfortunately, many of the symptoms arising from these multiple causes are very similar; hence many uninformed consumers perceive any adverse reaction as a food "allergy." Further complicating the issue, true allergic reactions may occur from parasites in contaminated seafood.

Food allergy is an abnormal reaction of the body's immune system, in that it recognizes and attacks something in a food or food ingredient that it perceives as a threat.
In people with food allergies, the body reacts to harmless food substances, such as fish or crustacean, by producing an antibody called immunoglobulin E (IgE).
When sensitized people are exposed to a food to which they are allergic, the immune system rallies its defenses, launching its chemical weapons to attack and destroy the perceived enemy. The reaction can manifest from hives to life threatening anaphylaxis.
This presentation will discuss the health impact of seafood allergy and strategies for the management of seafood allergens in food processing establishments.

Progress report on the ALASKA QUALITY SEAFOOD® PROGRAM

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The Alaska Quality Seafood® Program is based on modern manufacturing methods, such as ISO 9000 and the Plan-Do-Check-Act cycle of W. Edwards Deming. Most seafood starts with good intrinsic quality (taste, color, nutrition, purity, etc.).
But its extrinsic quality, measured as shelf-life (texture, odor) and appearance (gaping, bruising), is degraded by poor quality handling practices, fishery management techniques, and time-temperature abuse. Seafood markets are often reluctant to buy wild-caught Alaska seafood, because of its inconsistent quality. Our Program is a "voluntary-mandatory" program of quality assurance, resembling the Good Housekeeping Seal of Approval. The Program has four essential elements: (1) strict quality handling practices on the boat and in the plant, (2) well-known product grade standards, (3) independent verification of the handling practices and inspection of the product quality, and (4) marketing the value of AQS-Certified seafood. We operated in five Alaska salmon fishing regions in 2003. Participation by the fishing and processing industry is growing, and the seafood markets clearly pay higher prices for seafood of Certified quality.
So far, the Program has centered on salmon, but we expect to expand it to halibut and/or crab.

Listeria monocytogenes Contamination Patterns and Control Strategies in Smoked Seafood Processing Plants

Ken Gall, Martin Wiedmann, Jenny Scott, Vicki Lappi, Joanne Thimothe & Kendra Nightingale

Four smoked fish processing plants were used as a model system to characterize *Listeria* contamination patterns and the effectiveness of targeted intervention strategies. Twelve to 14 environmental samples, 6 raw material, and 6 finished product samples were collected in each plant monthly over a two year period and tested for *Listeria* spp. and *L. monocytogenes*. Dupont Qualicon *Eco*RI ribotyping was used to subtype *L. monocytogenes* isolates. Control strategies based on data from Year 1 were developed for each plant and implemented over a 3 to 4 month period in Year 2. These controls included employee training, plant specific upgrades, and new sanitation and cross contamination prevention procedures. Overall prevalence of environmental *Listeria* contamination showed significant reductions for non-food contact surfaces and overall core environmental samples after control strategies were implemented. Molecular subtyping showed that different L. monocytogenes subtypes persisted in 3 of the 4 plants throughout the study period and that these persistent subtypes were associated with finished product contamination events. This study suggests that controlling *Listeria*
in ready-to-eat seafood processing plants is a long-term commitment that requires consistent management of the food processing environment and employee practices. Identification and elimination of L. monocytogenes subtypes that have colonized niches in the plant and persist over long periods of time is a primary goal for smoked seafood processors as well as processors of other ready-to-eat foods to minimize the potential for finished product contamination.

Retail / Marketing PANEL

Lucina Lampila – Chair
Stephen T. (Steve) Grabacki
Sevim KOSE
Pete Granger Washington Sea Grant
Rich Springer
Larry Andrews ASMI

PANEL SUMMARY

Members of the Pacific Fisheries Technologists have the technical skills to make many products from the harvest of the sea. What does the market want? Where is the most value? How is technology applied to increase profit? Does technology create markets or markets create technology? The relation of good science and good business is key to success. How can this be accomplished?

Nutrition / Chefs Presentations

Sandra Stark – Chair

"Omega-3s: Are They All Created Equal?"

Cindy Snyder, MPH, RD
National Nutrition Services

In the past decade, there has been an escalating interest in the health benefits of omega-3 fatty acids. Research has established a link between intake of omega-3 (n-3) fatty acids and numerous chronic diseases such as heart disease, Alzheimer's disease and inflammation-related disorders. These fatty acids are also considered essential nutrients during pregnancy and early infancy for optimal brain and retinal development. Despite an exploding interest in n-3s, the public is frequently confused by information available through the media. The typical consumer does not understand that omega-3 fatty acids represent a family of polyunsaturated fats. The two most biologically active omega-3s are the long-chain fatty acids (LCFA), elcosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are found predominantly in seafood. Terrestrial sources of n-3 contain a shorter chain fatty acid, alpha-linolenic acid (ALA). The primary purpose of ALA is to serve as a precursor to the longer-chained fatty acids. Unfortunately, the human body does not efficiently convert ALA to longer-chained omega-3s. Conversion is influenced by a number of dietary factors, including the presence of other polyunsaturated fatty acids in the diet.

Currently, the media, policy makers and health professionals fail to distinguish between members of the omega-3 family. All omega-3s are treated equally when it comes to nutrition guidelines and policy in the U.S. In 2002, the U.S. National Academy of Sciences published recommendations on n-3 intake in its report on Dietary Reference Intakes for Macronutrients. Adequate Intake (AI) levels were established for only one of the omega-3 fatty acids. No recommendations were made for EPA and DHA.
This stands in sharp contrast to governing bodies in most of the developed world. Many developed countries have established clear dietary recommendations for total omega-3 fatty acids and the long-chain omega-3 fatty acids, EPA and DHA.
The seafood industry needs to promote the unique health benefits of marine omega-3s to educators and policy-makers in order to generate the most accurate public information of omega-3 fatty acids and health.

Learning Objectives: At the end of this presentation, the participant will be able to:

1) Identify the metabolic pathway for omega-3 fatty acids;
2) Recognize the distinction between short-chain and long-chain omega-3 fatty acids;
3) And understand the need to educate the media, policy makers, health professionals and the public concerning the unique health benefits of marine omega-3s.

Advances in omega-3 fatty acids and heart health.

Joyce A. Nettleton*, ScienceVoice Consulting, and Randy Rice, Alaska Seafood Marketing Institute.

Seventy years ago it was observed that people who consumed large amounts of fish and marine mammals did not develop heart disease. In the 1970s this benefit was linked to the content of long-chain omega-3 fatty acids (n-3 LC-PUFAs) abundant in fatty fish and marine mammals. Since then, thousands of research papers have documented the protective effects of n-3 LC-PUFAs in cardiovascular disease (CVD) and elucidated myriad mechanisms by which these fatty acids operate. Not until 2002 did the American Heart Association declare that people should consume fish, preferably fatty fish, twice a week to reduce risk of heart disease and mortality. Those with heart disease should consume even more. Scientific evidence continues to affirm and extend the health benefits of n-3 LC-PUFAs, yet CVD remains the leading cause of death.

The regular consumption of n-3 LC-PUFAs
from fish reduces the risk of cardiac arrhythmias and the chance of sudden cardiac death by 40%-50% or more. Risks of a first heart attack, stroke, and many CVD
risk factors are significantly lower among those who consume fish regularly. n-3 LC-PUFAs exert their beneficial effects in several ways: reducing the tendency for blood clotting, improving vascular function, modestly lowering blood pressure, improving the profile of blood lipids, reducing subclinical inflammation, and most recently, probably by stabilizing arterial plaques. No pharmacologic
agent has such diverse and powerful effects. We review the evidence linking n-3 LC-PUFAs with reduced risk of CVD and discuss some of barriers to increased fish consumption by Americans.

Seafood & Helpful Diets: The future looks bright for claims and dietary guidance

Robert Earl, MPH, RD Senior Director for Nutrition Policy, National Food Processors Association

Fish is nutritious and part of a healthful diet.
In recent years there has been substantial advancement in knowledge about nutrient requirements and diet and health relationships.
In an era where attention to diet and health is at an all-time high, the food industry must deliver to consumers a wide variety of foods designed to meet their dietary needs for a healthful lifestyle, as well as their specific, individual demands for products that taste good; are safe, nutritious, and convenient; and provide value. This presentation will provide information about the nutrition qualities of seafood related to diet and health, and current nutrient requirements and implications for seafood. How seafood fits in dietary guidance, food guides, nutrient content and health claims will be discussed in detail. There are numerous opportunities for seafood to be promoted as part of a healthful diet.

Carbs - they're not all bad!

Pam Vaillancourt, Director of Technical Sales, TIC Gums, Inc

Consumers has
always known the importance of seafood in a heart healthy diet and the seafood industry has enjoyed the benefits of including seafood in many weight control and healthy diet programs. Now, as Americans have seen waistlines increasing, have heard buttons popping, and have felt more unhealthy than ever…the "low carb" diet has busted onto the scene in a very big way.
An estimated 15 million to 30 million Americans are following some form of high protein, low carb weight loss program, such as the Atkins Nutritional Approach and this number is growing daily.

Low-carb diets are forcing the food industry as a whole to adapt. To provide low carb products, it will be important for seafood processors and manufacturers to review any value added items in the effort to reduce or eliminate carbohydrates.
Carbohydrates including flour, in the form of roux, and starch in general are the most common ingredients to thicken many foods. Most soups, sauces, gravies and even many seafood products, use roux, starch or a combination of the two to get just the right texture and mouthfeel. These ingredients change the way a food looks, the way it feels on the tongue, and the overall acceptability of the product. They are also the ingredients formulators are looking to replace; there are ingredients such as soluble dietary fiber that will work for the current highly promoted high protein, low carbohydrate diets.

This presentation is to provide information on the current low carbohydrate market, and to provide assistance for changes that are needed to make a low carbohydrate value added seafood product.

What it Takes to Build a Quality Product

Bret Lynch

The focus of "What it Takes
to Build a Quality Product". This will cover the path from sustainable fisheries and the education necessary for the consumer to trust in the industry.
Harvesting quality through the new product R & D process to the food service chef and to the consumer. There will be undertones on the trend for value added and course Low carbohydrate. Pam Vallancourte and I have coordinated our efforts. She will be on the trend of starch substitutes and low carb and my will be more of the focus of the seafood protein as the great source.

Differences in omega 3 fatty acids in Alaska chum and sockeye

Chuck Crapo
Bob Pfutzenreuter

University of Alaska
Fishery Industrial Technology Center
Kodiak, Alaska

Ocean run chum and sockeye salmon were collected from Alaska's major commercial fisheries and analyzed for proximate composition and omega-3 fatty acid content. Significant differences existed between fishing areas. Yukon and Kuskokwim chum salmon had the highest fat and omega-3 fatty acid contents of all chum salmon. Copper River sockeye had twice the fat and omega-3 fatty acid content of any other red salmon. While the sample size was small, it provided a baseline for comparing equivalent quality fish from different regions.

Nutrition / Chefs PANEL

Sandra Stark – Chair
Joyce Nettleton
Bob Earl, NFPA
Pam Vaillancourt
Bret Lynch
Cindy Snyder
Radisson chef

PANEL SUMMARY

"Fish is delicious and nutritious".
When properly handled and prepared fish can provide a vast range of pleasing flavors and textures. Fortunate consumers that experience good fish can become life long customers. Easy digestibility, excellent protein, and the health benefits of omega 3 oils are all clear selling points. Is the industry ready to capture a new consumer when the resolution to eat healthy brings them to seafood?

POSTER PRESENTATIONS

Pete Nicklason – Chair

"Isolation and Characterization of Trypsin from Pyloric Caeca of Monterey Sardine (Sardinops sagax caerulea)"

Francisco Javier Castillo-Yáñez1*, Ramón Pacheco-Aguilar1, Fernando Luis García-Carreño2, and María de los Ángeles Navarrete-Del Toro2.

ABSTRACT

Trypsin from pyloric caeca of Monterrey
sardine was purified by fractionation with ammonium sulfate, gel filtration, affinity, and ionic exchange chromatography. Fraction 102, obtained from ionic exchange chromatography, generated one band in SDS-PAGE with isoelectric focusing. The molecular weight of the isolated trypsin was 25,000 Da and showed esterase specific activity on TAME 4.5 times greater than amidase specific activity on BAPNA. The purified enzyme was inhibited partially by the serine-protease fenyl-methyl-sulfonyl-fluoride (PMSF) inhibitor, and entirely by the soybean trypsin inhibitor (SBTI) and benzamidine, but it was not inhibited by the metalloprotease inactivator EDTA, nor by the quimotrypsin inhibitor tosyl-L-phenylalanine chloromethyl ketone (TPCK). The optimum pH for activity was 8.0 and maximum stability was observed between pH 7 and 8. A marked loss in stability was observed below pH 4 and above pH 11. Activity was optimum at 50 °C, and labile at higher temperatures. Kinetic trypsin constants Km and Kcat were 0.051mM and 2.12 sec-1 respectively, while the catalytic efficiency (Kcat./Km) was 41 sec-1 mM-1. Biochemical characteristics of trypsin extracted from Monterey sardine make this enzyme a possible biotechnological tool for the food industry.

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Frozen storage of fish proteins as affected by various phosphate blends

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POSTER PRESENTATION

Fish protein is a highly functional and healthy source of protein for human consumption. However, due to inherent freeze-induced protein denaturation, phosphate, sugar, and sorbitol have been used to cryoprotect fish proteins during frozen storage. Phosphate is used to raise muscle pH and chelate metal ions in the muscle. Specific phosphate functionality depends on its biochemical properties and various phosphate blends could be utilized to combine specific functions provided by different phosphates.
The effects of various phosphate blends, though on the biochemical properties of fish protein have seldom been investigated.
Objectives were to investigate the effect of various blends of phosphates on fish proteins during repeated freezing/thawing and to determine an adequate phosphate blend for use as a cryoprotectant of fish proteins.
Raw Pacific whiting surimi (fish protein) was mixed with 4% sugar, 5% sorbitol, and phosphate (0 or 0.3%). Seven phosphate blends were used: conventional phosphate (CP), P1, P2, P3, P4, P5, and P6.
Buffering capacity of the new blends was similar (P1 and P2) or inferior (P3, P4, P5, and P6) to CP. According to the dynamic test, P1, P2, P3, and P4 suppressed protein denaturation more effectively than CP. Water retention ability and gel texture of P1, P2, P3, and P4 were superior, whereas, P5 and P6 were similar to CP. P1, P2, P3, and P4 phosphate blends were superior to CP as a cryoprotectant for fish proteins and therefore could be effectively used in commercial practice.

The effect of processing techniques used on whiting burgers stored at refrigerated conditions in relation to its quality

Sevim KOSE, Muhammet BORAN, Gokhan BORAN

Whiting is commonly sold as fresh in Turkish market although it is processed in surimi or other products for human consumption around the world. In this study, a new product was produced from whiting (Merlangius merlangus) as burgers or fish balls using three different techniques by adding similar ingredients as is used in making meat balls, which is a Turkish food speciality. The commonly used method in Turkey for producing fish burgers or fish balls is to mince fish after cleaning and gutting, then adding other ingredients and shaping it. Therefore this method was chosen

as the first method as we described it as plain mincing technique. Surimi, which is not commonly used in this country, was the second method. Thirdly, a local home make cooking technique applied as we described it as pre-cooked method. In this method, the headed and gutted fish is firstly kept very shortly in boiled water in order to remove flesh from the bones. Then other ingredients were added all the products, mixed and shaped. They were all stored at the refrigerated conditions to analyse
their shelf life. Sensory, chemical and bacteriological analyses were carried out to test their quality changes during storage. The precooked samples showed best quality according to its shelf life, taste and chemical and bacteriological results. The plain minced method showed the worst quality in relation to the quality. Surimi products had better quality to form a shape but its whiteness was not as good as the pre-cooked ones. The plain minced burgers were difficult to shape and required more flour to have right thickness unless it was kept to drain. It is concluded that pre-cooked method for processing whiting into burgers or other ready made products might be an alternative technique to surimi in future around the world. In this research work, difficulties in testing the quality of mixed fish products were also discussed.

Fatty Acid Composition and Differential Scanning Calorimetry of Aquacultured White Shrimp as Affected by Dietary Fatty Acids

Ezquerra-Brauer Josafat Marina(1), Arredondo-Vega Bertha Olivia (2), Rouzaud-Sández Ofelia(1) and Civera-Cerecedo Roberto(2).

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Presentation: poster

Topic: Aquaculture and feeds

Three groups of white shrimp (Litopenaeus vannamei) were fed isocaloric diets containing varying concentrations of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The rate of growth, fatty acid composition and thermal denaturation of muscle protein were determined. Shrimp fed diets containing 0.6 % of EPA or DHA showed a better growth rate than those fed diets containing 0.4% EPA and 0.4% DHA. Fatty acid composition of the edible muscle tissue did not reflected stastistical
differences among diets. Differential scanning calorimetric analysis produced three transition peaks for shrimp whole muscle corresponding to myosin (I) and actin (III) denaturation. Peak II could be attribbuted to myosin, sarcoplasmic proteins, and connective tissue. The enthalpy of peak I for shrimp fed diets containing 0.4% of DHA and EPA was quite low compared to those fed diets containing 0.6 % DHA or EPA. Whole muscle from shrimp fed diets containing 0.6% EPA showed the highest enthalpy of transition in the myosin peak (I) and sarcoplasmatic peak or connective tissue (II). Considering that enthalpy is an indirect indicator of the muscle proteins content, feed shrimps with 0.6% EPA would give a best growth and with best myosin synthesis.

Omega-3 polyunsaturated fatty acid concentrate from sardine oil by means of lipase assisted hydrolysis.

Tomoko Okada* and Michael T. Morrissey
Oregon State University Seafood Laboratory, 2001 Marine Drive, Rm 253, Astoria, OR, 97103

Abstract
Sardines (Sardinops sagax) are a relatively new fishery for the Oregon-Washington coastal area. The fishery is concentrated at the mouth of the Columbia River
and the catch volume has increased from 1.7 million pounds in 1999 to over 60 million pounds in 2003. Most of the fish are 3-5 year olds having an average weight of 183.1 gm and length of 222 mm. The majority of the sardines are sent whole-frozen to Asian markets and used as bait for the long-line tuna fisheries. To expand market opportunities, research of sardine utilization is in progress, and the recovery of oil from sardines will be one of the options due to its high omega-3 PUFAs content. A study was conducted on production of omega-3 PUFA concentrate from oil from sardines by lipase-catalyzed hydrolysis method and the optimal parameters were determined. Sardines were obtained from local fish plant in Astoria, OR, and the oil was extracted and refined. Commercially available microbial lipases, from Candida Rugosa, Candida cylindracea, Aspergillus niger, Mucor javanicus, were used in this study, and enzymatic hydrolysis were maintained at 37℃
with constant stirring for 1.5,3,6 and 9 hr. The highest degree of hydrolysis (75.64%) was shown by treatment with

lipase from 500U Candida Rugosa
after 9 hr. Fatty acids composition analysis by gas chromatography showed the original oil contained 19.44% of EPA and 7.62% of DHA (area %). Treatment with lipase from Candida cylindracea for 9 hr with 500U per gm oil yielded the highest omega-3 PUFAs content (35.08% of EPA and 19.23% of DHA). Treatment with 250U Candida Rugosa for 6 hr also yielded high levels of omega-3 PUFAs (29.75% of EPA and 14.85% of DHA). Lipase-catalyzed hydrolysis is a viable method to concentrate omega-3 PUFAs from sardine oil and has potential different uses.

The Culinology® Framework for food product development: Application to seafood products.

Sergio F. Almonacid* and Michael T. Morrissey
Oregon State University Seafood Laboratory & Dept of Food Science and Technology

Today's technological changes coupled with heightened domestic and international competition require companies to develop new products to respond to changing markets. A new trend in new food product development is the blending of the culinary arts with food science to design creative successful products. This organizational framework is known as Culinology®, which consists of four steps from Concept Design/Specification, to Detailed Design/Prototype.
This study describes the research efforts to develop products based on Hispanic recipes with high perishable ingredients like seafood and vegetables by applying a Culinology® framework to manage the development process. Five prototype products were developed as starting points, then, they were reduced to three, which were subjected to shelf-life tests. The formulated products were subjected to mild thermal and High Hydrostatic Pressure processes, then, they were stored under refrigeration conditions at 4-5ºC and maintained at a pH value of 4.2. Microbiological results showed lag phase periods from 3.6 to 7.8 days and an expected shelf-life of 25 to 45 days, when APC reached a value of 106 cfu/g. Results led to the elimination of one product, while two products were chosen for the final stages of product refining and marketing. The Culinology® framework proved to be an efficient link approach to product development as assessed by the 7 Ss McKinsey´s framework, opening new opportunities for small and mid-size companies.

Effects of freezing-thawing in melanization, composition of muscle proteins, and texture of Pacific white shrimp

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Penaeus vannamei is a shrimp farmed and harvested in Mexico along the Pacific coast. The main commercial packaging is in the beheaded-frozen style. Thawing for consumption affects sensorial characteristics of the product. We evaluated the effects of freezing and thawing on melanosis, composition of muscle proteins, and texture attributes, such as: water holding capacity, shear stress, and hardness. We used whole specimens (27.75 ± 2.81 g) with tail muscles weighing 14.51 ± 1.70 g. Two types of freezing were evaluated, cryogenic (liquid nitrogen) and fast (-20 °C), and two thawings
rates, "adequate" (0 °C) and "inadequate" (25 °C). No differences were found among specimens of either gender or the molting stage,
hence, this was not considered a factor in the observed differences in freeze-thaw procedures. During thawing, shrimp developed black spots in the gills, digestive gland, and abdomen, while control organisms showed spots only after 2 or 3 days of storage at 0 °C. Changes in myofibril protein composition was observed. Water holding capacity was also affected by freeze-thaw procedures.

On-Board Handling Techniques for Albacore Tuna (Thunnus alalunga) with Electronic Data Capture for the Northwest Albacore Fishery.

***Michael Thompson**- Oregon Sate University
Gil Sylvia- Coastal Oregon Marine Experimental Station, Newport, Oregon
Michael Morrissey- OSU Seafood Laboratory, Astoria, Oregon

Albacore Tuna (Thunnus alalunga), as members of the Scrombroid family, are capable of, through the use of a counter-current heat exchange mechanism, thermo-regulation and can exhibit internal temperatures after landing of more than 20? C above ambient sea-surface temperatures. These high internal temperatures, which can stimulate

bacterial growth, make the time immediately after landing vital in preserving quality. This study was designed to investigate which on-board handling methods are crucial in maintaining a high level of quality. One-hundred and thirty-two albacore were collected off the coast of Oregon during the summer of 2003. These were put through thirty-two experimental procedures with five parameters including bleeding method, time, position, cooling and immobilization.
Each fish will be analyzed by computer for visual appearance and tissue samples will be analyzed for hemoglobin content.
The results of this study will be used to test a complete on-board handling system, capable of linking to electronic data capture devices, during the 2004 albacore season.

Properties of Soluble Protein Powders from Pollock Byproducts

Subramaniam Sathivel[1] and Peter J. Bechtel[2]

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More than one million metric tons of Pollock (*Theragra chalcogramma*) is harvested annually from Alaska waters. The yield of byproducts from Pollock fish filleting processes is approximately 66%. Many Pollock byproducts can be used for further processing to make food ingredients. In addition, proteins can be extracted and powders made from byproducts.
The objectives of this study were to isolate protein fraction from different Pollock byproducts and evaluate protein, lipid, ash, amino acid and mineral contents, and functional properties included fat absorption, emulsifying capacity, water absorption capacity, and color.

Byproducts used for extracting protein included Pollock viscera, heads, frames, trimmings, gonads, and livers. The samples were separately minced, and water was added (water:mince=1:1, V/W). The mixtures were heated at 85 C for 60 minutes and after centrifugation the soluble proteins fractions were recovered and freeze dried.

The soluble protein powders prepared from viscera, liver, head, frame, trimming, and gonads contained 59.8%, 63.5%, 59.1, 75%, 81.3 and 78.2% protein, respectively. The emulsifying stability was 71.2, 77, 72, 72, 89.6, and 52.8% for viscera, liver, head, frame, trimming, and gonads, respectively. Highest (12.8 mL of oil/g protein) and lowest fat absorption (1.5 mL
of oil/g protein) values were observed for Pollock trimmings and liver, respectively. Water absorption capacity (mL/g) of Pollock head and frame protein powders were different from other protein powders. All soluble protein powders had desirable essential amino acid profiles.

There were some differences detected between chemical and functional properties of soluble protein powders from Pollock byproducts. The soluble protein powders from Pollock byproducts could have potential uses as functional food and feed ingredients.

Physical, textural and microstructural properties of restructured adductor muscles of two scallop species using two cold-binding systems

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ABSTRACT

The objective for this work was to evaluate the effect of fibrinogen-thrombin (FT) and caseinate-transglutaminase (CT) cold-set binding systems on the physical, textural and microstructural properties of restructured adductor muscles of two commercially important scallop species of Mexico; the catarina scallop (*Argopecten ventricosus*) and the lion's paw scallop (*Nodipecten subnodosus*). Surface pH was measured for unrestructured muscles. Color, water holding capacity (WHC) and texture, including Warner-Bratzler (WB) shear test and texture profile analysis (TPA: hardness, cohesiveness, springiness, gumminess and adhesiveness) were determined for both restructured and unrestructured samples. The binding regions between pieces of muscle and binder matrix were analyzed by light microscopy. pH,

cohesiveness and springiness of unrestructured meats was significantly (P<0.05) higher in the lion's paw while WB-shear, hardness and adhesiveness were higher in the catarina scallop. Redness (a*) was only affected in adductors of lion's paw scallop (P < 0.05) treated with FT, which also produced a drop in Hue angle (H_{ab})) and an increase in yellowness (b*). CT did not affect color of restructured samples of both species (P > 0.05). There was no effect of cold-set binding systems on WHC of the muscles. Binders affected in different way cohesiveness and springiness. By comparing the effect of species and binding system on textural features, significant (P < 0.05) interactions were observed for WB shear test, hardness, cohesiveness and gumminess. Differences in microstructure of binder matrices were observed. CT matrix exhibited solid continuous phase, whereas FT system presented a non-continuous matrix whit different level in aggregation of the material. This could be related with the lower values (P<0.05) in cohesiveness, springiness and gumminess observed for restructured with FT system. Results indicate that not only the restructuring system but also the specie have an influence on characteristics on restructured scallop's meats since texture was more affected by the binder in catarina whereas color was in lion's paw.

Mercury Content in West Coast Troll-Caught Albacore Tuna (Thunnus alalunga)

Michael T. Morrissey*, Tomoko Okada and Rosalee Rasmussen
Oregon State University Seafood Laboratory, 2001 Marine Drive, Astoria, OR 97103

Ninety-one albacore tuna (Thunnus alalunga) captured during the 2003 commercial fishing season were tested for mercury content in the fish muscle.
Additional information such as location, weight, length, lipid and moisture content were also collected. The fish were harvested between 32.72 degrees north (off Southern California) and 48.30 degrees north (off the coast of British Columbia, Canada) from a period of July to November. Fish weight ranged from 3.14 to 11.62 kg and length of 50.8 - 86.4 cm. Mercury content was found to range from a low of 0.027 ug/g (ppm) to a high of 0.26 ug/g in the samples tested. The average mercury content was 0.14 ug/g which is well below the US FDA and Canadian standards (1.0 ug/g and 0.50 ug/g respectively).
There was a positive correlation of length and weight of albacore with mercury content. There was no correlation with date of capture.
Results indicate that West Coast troll-caught albacore has low levels of mercury in the edible flesh and fall below international standards for mercury levels in fish.

"Characterization of Acidic Proteolytic Enzymes from Monterey Sardine (Sardinops sagax caerulea) Viscera"

Francisco Javier Castillo-Yáñez[1*], Ramón Pacheco-Aguilar[1], Fernando Luis García-Carreño[2], and María de los Ángeles Navarrete-Del Toro[2].

ABSTRACT

Total enzyme activity of whole viscera, and partial characterization of acidic proteases from Monterey sardine viscera are presented. Major proteolytic
activity in alkali (pH 10) and minor activity in acid (pH 3) were detected. From purified acidic proteases, 6 fractions with high activity were selected. One fraction (42) showed one band on SDS-PAGE and two bands on isoelectrofocusing, with pI
close to 4.0 and 4.5, respectively. The optimal pH for acidic protease activity was 2.5, with high stability in the acid range and marked loss of activity at neutral and alkaline pH. The [f1]optimum temperature was 45ºC, and activity was high at 10ºC, whereas denaturation occurred above 55ºC. Activity was inhibited by Pepstatin A but not by SBTI or EDTA. The general characteristics of these enzymes resemble those of the digestive enzymes of other fish. Because Monterey sardine is abundant in Mexico, it is a potential source for biological
reagent production.

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Poster presentation by: Francisco Javier Castillo Yañez. Ph.D. Student.
To be considered in the Graduate Student Paper Presentation Contest

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Regulatory Updates

Cindy Wu, Chair

America Charles Breen, FDA

Canada Richard Grant, CFIA

Mexico

USDC Update Mr. Roxy Triplett, WIB

Washington State Will Satak, WA Department of Agriculture

Oregon State Bob Gerding, Oregon Department of Agriculture

Common Mistakes in HACCP

Liz Brown, *Marine Advisory Program*

All seafood processors in the United States
are required to perform a hazard analysis on each of their products and a Hazard Analysis and Critical Control Point plan is required to address any hazards identified as reasonably likely to occur. The FDA contracts with the Alaska Department of Environmental Conservation to perform HACCP audits on many of the seafood processors throughout the state. These audits resulted in an awareness of mistakes repeated from processor to processor in hazard analyses and HACCP
plans. This list is intended to assist processors in avoiding common mistakes when complying with the Seafood HACCP rule.

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[f1]Optima is the plural of optimum!!!

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