 Emerging and potential technologies for facilitating shrimp peeling: A review

Ready-to-eat shrimp processing is challenging due to the complex biological design with the shell tightly connected to the meat. Several techniques have been developed to weaken or loosen this connection, thus facilitating the subsequent peeling. The loosening process is typically undertaken by maturing the shrimps on ice or in brine, which requires several days, consequently risking loss in food quality and safety. To overcome those issues, developing novel technologies that not only assist the shell loosening but also retain the meat quality, safety and yield, is of paramount importance. This article reviews some essential characteristics of shrimp, the current methods of maturation, the use of the emerging technologies (high pressure, microwave, ultrasound, and enzyme) to facilitate the peeling of foods and clarify the potential of using them in shrimp shell removal. Industrial relevance During the production of peeled products, the shrimp processing industry has suffered from drawbacks of the traditional ice/brine maturetions - a step facilitating the peeling. The drawbacks include yield loss, reduction of organoleptic quality, risk of microorganisms, time consuming issue and discontinuous process due to a long time soaking in maturing tanks. Therefore the need for seeking alternative methods to replace the traditional long maturations has grown, that address the future trends in sustainable processing of ready-to-eat shrimps. Emerging technologies e.g. high pressure, enzyme, ultrasound and microwave can potentially become the alternatives since they have strong peeling effects on lobsters, crabs, bivalve mollusks, eggshells, human skin, fruits and vegetables. Also these technologies offer benefits such as short process time, retained nutritional and sensorial characteristics, energy and water efficiency which all promise higher profits for the shrimp industry.
Discovery, cloning and characterisation of proline specific prolyl endopeptidase, a gluten degrading thermo-stable enzyme from Sphaerobacter thermophiles

Gluten free products have emerged during the last decades, as a result of a growing public concern and technological advancements allowing gluten reduction in food products. One approach is to use gluten degrading enzymes, typically at low or ambient temperatures, whereas many food production processes occur at elevated temperature. We present in this paper, the discovery, cloning and characterisation of a novel recombinant thermostable gluten degrading enzyme, a proline specific prolyl endoprotease (PEP) from Sphaerobacter thermophiles. The molecular mass of the prolyl endopeptidase was estimated to be 77 kDa by using SDS-PAGE. Enzyme activity assays with a synthetic dipeptide Z-Gly-Pro-p-nitroanilide as the substrate revealed that the enzyme had optimal activity at pH 6.6 and was most active from pH 5.0-8.0. The optimum temperature was 63 °C and residual activity after one hour incubation at 63 °C was higher than 75 %. The enzyme was activated and stabilized by Co2+ and inhibited by Mg2+, K+ and Ca2+ followed by Zn2+, Na+, Mn2+, Al3+, and Cu2+. The Km and kcat values of the purified enzyme for different substrates were evaluated. The ability to degrade immunogenic gluten peptides (PQPQLPYPQLPY (α-gliadin) and SQQQFPQPFQPQFPQ (γ-hordein)) was also confirmed by enzymatic assays and mass spectrometric analysis of cleavage fragments. Addition of the enzyme during small scale mashing of barley malt reduced the gluten content. The findings here demonstrate the potential of enzyme use during mashing to produce gluten free beer, and provide new insights into the effects of proline specific proteases on gluten degradation.

General information
State: Published
Organisations: National Food Institute, Research Group for Microbial Biotechnology and Biorefining, Research Group for Food Production Engineering, Department of Biotechnology and Biomedicine, Leibniz-Institut DSMZ, University of Mysore
Authors: Shetty, R. (Intern), Vestergaard, M. (Intern), Jessen, F. (Intern), Hägglund, P. (Intern), Knorr, V. (Ekstern), Koehler, P. (Ekstern), Prakash, H. (Ekstern), Hobley, T. J. (Intern)
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Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.061 SNIP 1.214 CiteScore 3.12
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
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ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.204 SNIP 1.281 CiteScore 2.78
ISI indexed (2012): ISI indexed yes
A soft texture is undesired in Atlantic salmon as it leads to downgrading and reduced yield, yet it is a factor for which the cause is not fully understood. This lack of understanding highlights the need for identifying the cause of the soft texture and developing solutions by which the processing industry can improve the yield. Changes in muscle protein profiles can occur both pre- and postharvest and constitute an overall characterization of the muscle properties including texture. The aim of this study was to investigate this relationship between specific muscle proteins and the texture of the salmon fillet. Samples for 2D-gel-based proteomics were taken from the fillet above the lateral line at the same position as where the texture had been measured. The resulting protein profiles were analyzed using multivariate data analysis. Sixteen proteins were found to correlate to the measured texture, showing that it is possible to predict peak force based on a small subset of proteins. Additionally, eight of the 16 proteins were identified by tandem mass spectrometry including serum albumin, dipeptidyl peptidase 3, heat shock protein 70, annexins, and a protein presumed to be a titin fragment. It is contemplated that the identification of these proteins and their significance for the measured texture will contribute to further understanding of the Atlantic salmon muscle texture.
This study aimed to characterise peptide fractions (>5 kDa, 3–5 kDa and <3 kDa) with antioxidative activity obtained from a cod protein hydrolysate. The free amino acids in all fractions were dominated by Ala, Gly, Glu and Ser. The total amino acid composition had high proportions of Lys, Ala and Glu. The 3–5 kDa and <3 kDa fractions were further fractionated by size exclusion chromatography. All sub-fractions showed high Fe^{2+} chelating activity. The DPPH radical-scavenging activity of the 3–5 kDa fraction was exerted mainly by one sub-fraction dominated by peptides with masses below 600 Da. The DPPH radical-scavenging activity of the <3 kDa fraction was exerted by sub-fractions with low molecular weight. The highest reducing power was found in a sub-fraction containing peptides rich in Arg, Tyr and Phe. Both free amino acids and low molecular weight peptides thus seemed to contribute to the antioxidative activity of the peptide fractions, and Tyr seemed to play a major role in the antioxidant activity.
Bioactive compounds in commercial nitrite-cured cooked pork products

General information
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering, Research Group for Analytical Food Chemistry
Authors: Pedersen, S. T. (Intern), Duedahl-Olesen, L. (Intern), Jessen, F. (Intern)
Number of pages: 1
Publication date: 2016
Event: Poster session presented at First Food Chemistry Conference - Shaping the Future of Food Quality, Health and Safety, Amsterdam, Netherlands.
Main Research Area: Technical/natural sciences
Electronic versions:
Biological variation of the raw material and processing conditions affect the yield and quality of fast-marinated herring

General information
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering
Authors: Ekgreen, M. H. (Intern), Jørgensen, B. M. (Intern), Martínez Lopez, B. (Intern), Frosch, S. (Intern), Jessen, F. (Intern)
Number of pages: 1
Publication date: 2016
Event: Poster session presented at 46th conference of the West European Fish Technologists’ Association (46th WEFTA), Split, Croatia.
Main Research Area: Technical/natural sciences

Effect of sodium bicarbonate and varying concentrations of sodium chloride in brine on the liquid retention of fish (Pollachius virens L.) muscle: High quality low salt saithe muscle

BACKGROUND Negative health effects associated with excessive sodium (Na) intake have increased the demand for tasty low-Na products (<2% NaCl) rather than traditional heavily salted fish products (~20% NaCl). This study investigates the causes of improved yield and liquid retention of fish muscle brined with a combination of salt (NaCl) and sodium bicarbonate (NaHCO3). RESULTS Water characteristics and microstructure of saithe (Pollachius virens L.) muscle brined in solutions of NaCl and NaHCO3 or NaCl alone were compared using low-field nuclear magnetic resonance (LF-NMR) T2 relaxometry, microscopy, salt content, liquid retention and colorimetric measurements. Saithe muscle was brined for 92 h in 0, 30, 60, 120 or 240 g kg−1 NaCl or the respective solutions with added 7.5 g kg−1 NaHCO3. NaHCO3 inclusion improved the yield in solutions ranging from 0 to 120 g kg−1 NaCl, with the most pronounced effect being observed at 30 g kg−1 NaCl. The changes in yield were reflected in water mobility, with significantly shorter T2 relaxation times in all corresponding brine concentrations. Salt-dependent microstructural changes were revealed by light microscopy, where NaHCO3 supplementation resulted in greater intracellular space at 30 and 60 g kg−1 NaCl. CONCLUSION Sodium bicarbonate addition to low-salt solutions can improve yield and flesh quality of fish muscle owing to altered water mobility and wider space between the muscle cells.
Growth promotion in pigs by oxytetracycline coincides with down regulation of serum inflammatory parameters and of hibernation-associated protein HP-27

The growth promoting effect of supplementing animal feed with antibiotics like tetracycline has traditionally been attributed to their antibiotic character. However, more evidence has been accumulated on their direct anti-inflammatory effect during the last two decades. Here we used a pig model to explore the systemic molecular effect of feed supplementation with sub therapeutic levels of oxytetracycline (OTC) by analysis of serum proteome changes. Results showed that OTC promoted growth, coinciding with a significant down regulation of different serum proteins related to inflammation, oxidation and lipid metabolism, confirming the anti-inflammatory mechanism of OTC. Interestingly, apart from the classic acute phase reactants also down regulation was seen of a hibernation associated plasma protein (HP-27), which is to our knowledge...
the first description in pigs. Although the exact function in non-hibernators is unclear, down regulation of HP-27 could be consistent with increased appetite, which is possibly linked to the anti-inflammatory action of OTC. Given that pigs are good models for human medicine due to their genetic and physiologic resemblance, the present results might also be used for rational intervention in human diseases in which inflammation plays an important role such as obesity, type 2 diabetes and cardiovascular diseases.

General information
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering, KU Leuven, University of Veterinary Medicine, University of Murcia
Authors: Soler, L. (Ekstern), Miller, I. (Ekstern), Hummel, K. (Ekstern), Razzazi-Fazeli, E. (Ekstern), Jessen, F. (Intern), Escribano, D. (Ekstern), Niewold, T. (Ekstern)
Pages: 1277-1286
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Journal: Electrophoresis
Volume: 37
Issue number: 10
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.64 SJR 0.85 SNIP 0.777
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.851 SNIP 0.825 CiteScore 2.53
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.056 SNIP 0.892 CiteScore 2.88
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.154 SNIP 0.992 CiteScore 3.13
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.368 SNIP 0.983 CiteScore 3.24
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.525 SNIP 0.923 CiteScore 3.17
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.591 SNIP 0.932
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.481 SNIP 1.014
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.692 SNIP 0.991
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.817 SNIP 1.109
Scopus rating (2006): SJR 2.142 SNIP 1.243
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.872 SNIP 1.269
Interactions between Surfactants in Solution and Electrospin Protein Fibers: Effects on Release Behavior and Fiber Properties

Intermolecular interaction phenomena occurring between endogenous compounds, such as proteins and bile salts, and electrospin compounds are so far unreported, despite the exposure of fibers to such biorelevant compounds when applied for biomedical purposes, e.g., tissue engineering, wound healing, and drug delivery. In the present study, we present a systematic investigation of how surfactants and proteins, as physiologically relevant components, interact with insulin-loaded fish sarcoplasmic protein (FSP) electrospin fibers (FSP-Ins fibers) in solution and thereby affect fiber properties such as accessible surface hydrophilicity, physical stability, and release characteristics of an encapsulated drug. Interactions between insulin-loaded protein fibers and five anionic surfactants (sodium taurocholate, sodium taurodeoxycholate, sodium glycocholate, sodium glycodeoxycholate, and sodium dodecyl sulfate), a cationic surfactant (benzalkonium chloride), and a neutral surfactant (Triton X-100) were studied. The anionic surfactants increased the insulin release in a concentration-dependent manner, whereas the neutral surfactant had no significant effect on the release. Interestingly, only minute amounts of insulin were released from the fibers when benzalkonium chloride was present. The FSP-Ins fibers appeared dense after incubation with this cationic surfactant, whereas high fiber porosity was observed after incubation with anionic or neutral surfactants. Contact angle measurements and staining with the hydrophobic dye 8-anilino-1-naphthalenesulfonic acid indicated that the FSP-Ins fibers were hydrophobic, and showed that the fiber surface properties were affected differently by the surfactants. Bovine serum albumin also affected insulin release in vitro, indicating that also proteins may affect the fiber performance in an in vivo setting.

General information
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Organisations: National Food Institute, Research Group for Nano-Bio Science, Research Group for Food Production Engineering, University of Copenhagen
Authors: Boutrup Stephansen, K. (Intern), Garcia-Díaz, M. (Ekstern), Jessen, F. (Intern), Chronakis, I. S. (Intern), Nielsen, H. M. (Ekstern)
Number of pages: 8
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): CiteScore 4.84 SJR 1.513 SNIP 1.222
Web of Science (2016): Indexed yes
Non-invasive volume estimation of fish fillets/cutlets using structured light

General information
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering
Authors: Skytte, J. L. (Intern), Ekgreen, M. H. (Intern), Jessen, F. (Intern)
Number of pages: 1
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Event: Poster session presented at 46th conference of the West European Fish Technologists' Association (46th WEFTA), Split, Croatia.
Main Research Area: Technical/natural sciences
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Publication: Research - peer-review › Poster – Annual report year: 2016

Peellability and quality changes during ice maturation of shrimp (Pandalus borealis)

General information
State: Published
**Protein changes in shell and epidermis of shrimp (Pandalus borealis) after maturation on ice or in salt**

**General information**
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering, University of Copenhagen, Launis A/S, Royal Greenland A/S
Authors: Gringer, N. (Intern), Thi Dang, T. (Ekstern), Olsen, K. (Ekstern), Bøknæs, N. (Ekstern), Schlippe-Steffensen, K. (Ekstern), Orlien, V. (Ekstern), Jessen, F. (Intern)
Number of pages: 1
Publication date: 2016
Event: Poster session presented at 46th conference of the West European Fish Technologists’ Association (46th WEFTA), Split, Croatia.
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**Bioactive protein-based nanofibers interact with intestinal biological components resulting in transepithelial permeation of a therapeutic protein**

Proteins originating from natural sources may constitute a novel type of material for use in drug delivery. However, thorough understanding of the behavior and effects of such a material when processed into a matrix together with a drug is crucial prior to further development into a drug product. In the present study the potential of using bioactive electrospun fish sarcoplasmic proteins (FSP) as a carrier matrix for small therapeutic proteins was demonstrated in relation to the interactions with biological components of the intestinal tract. The inherent structural and chemical properties of FSP as a biomaterial facilitated interactions with cells and enzymes found in the gastrointestinal tract and displayed excellent biocompatibility. More specifically, insulin was efficiently encapsulated into FSP fibers maintaining its conformation, and subsequent controlled release was obtained in simulated intestinal fluid. The encapsulation of insulin into FSP fibers provided protection against chymotrypsin degradation, and resulted in an increase in insulin transport to around 12% without compromising the cellular viability. This increased transport was driven by interactions upon contact between the nanofibers and the Caco-2 cell monolayer leading to the opening of the tight junction proteins. Overall, electrospun FSP may constitute a novel material for oral delivery of biopharmaceuticals.

**General information**
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Organisations: National Food Institute, Research Group for Nano-Bio Science, Research Group for Food Production Engineering, University of Copenhagen
Authors: Boutrup Stephansen, K. (Intern), García-Díaz, M. (Ekstern), Jessen, F. (Intern), Chronakis, I. S. (Intern), Nielsen, H. (Ekstern)
Number of pages: 9
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Publication date: 2015
Main Research Area: Technical/natural sciences
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Volume: 495
Issue number: 1
Design and characterization of self-assembled fish sarcoplasmic protein-alginate nanocomplexes

Macrostructures based on natural polymers are subject to large attention, as the application range is wide within the food and pharmaceutical industries. In this study we present nanocomplexes (NCXs) made from electrostatic self-assembly between negatively charged alginate and positively charged fish sarcoplasmic proteins (FSP), prepared by bulk mixing. A
concentration screening revealed that there was a range of alginate and FSP concentrations where stable NCXs with similar properties were formed, rather than two exact concentrations. The size of the NCXs was 293 +/- 3 nm, and the zeta potential was -42 +/- 0.3 mV. The NCXs were stable in water, gastric buffer, intestinal buffer and HEPES buffered glycose, and at all pH values from 2 to 9 except pH 3, where they aggregated. When proteolytic enzymes were present in the buffer, the NCXs were degraded. Only at high concentrations the NCXs caused a decreased viability in HeLa and U2OS cell lines. The simple processing procedure and the high stability of the NCXs, makes them excellent candidates for use in the food and pharmaceutical industry. (C) 2015 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: National Food Institute, Research Group for Nano-Bio Science, Research Group for Food Production Engineering, Technical University of Denmark, University of Copenhagen, University of Munster
Authors: Boutrup Stephansen, K. (Intern), Mattebjerg, M. A. (Intern), Wattjes, J. (Ekstern), Milisavljevic, A. (Ekstern), Jessen, F. (Intern), Qvortrup, K. (Ekstern), Goycoolea, F. M. (Ekstern), Chronakis, I. S. (Intern)
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Main Research Area: Technical/natural sciences

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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.815 SNIP 1.316 CiteScore 3.38
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.861 SNIP 1.325 CiteScore 3.13
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.849 SNIP 1.452 CiteScore 3.48
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.796 SNIP 1.313 CiteScore 2.77
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.689 SNIP 1.21 CiteScore 2.73
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.865 SNIP 1.211
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.799 SNIP 1.189
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.749 SNIP 0.98
Scopus rating (2007): SJR 0.627 SNIP 1.001
Scopus rating (2006): SJR 0.51 SNIP 0.806
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.564 SNIP 1.179
Growth hormone transgenesis influences muscle proteome of Coho salmon (Oncorhynchus kisutch)

General information
State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering, University of Aberdeen, Fisheries and Oceans Canada
Authors: Jessen, F. (Intern), Causey, D. R. (Ekstern), Macqueen, D. J. (Ekstern), Devlin, R. H. (Ekstern)
Number of pages: 1
Publication date: 2015
Event: Poster session presented at 5th Trans-Atlantic Fisheries Technology conference (45th WEFTA meeting), Nantes, France.
Main Research Area: Technical/natural sciences

Interactions between electrospun fibers and the surrounding biological environment; cells and small molecules

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Organisations: National Food Institute, Research Group for Nano-Bio Science, Research Group for Food Production Engineering, University of Copenhagen
Authors: Stephansen, K. (Intern), García-Díaz, M. (Ekstern), Jessen, F. (Intern), Nielsen, H. M. (Ekstern), Chronakis, I. S. (Intern)
Number of pages: 1
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Poster presentation
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Proteomanalyse: To-dimensjonal gelelektroforese av Nordsjøsild i forhold til modningstid


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Authors: Jessen, F. (Intern), Skåra, T. (Ekstern)
Number of pages: 11
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The effects of eating marine- or vegetable-fed farmed trout on the human plasma proteome profiles of healthy men

Most human intervention studies have examined the effects on a subset of risk factors, some of which may require long-term exposure. The plasma proteome may reflect the underlying changes in protein expression and activation, and this could be used to identify early risk markers. The aim of the present study was to evaluate the impact of regular fish intake on the plasma proteome. We recruited thirty healthy men aged 40 to 70 years, who were randomly allocated to a daily meal of chicken or trout raised on vegetable or marine feeds. Blood samples were collected before and after 8 weeks of intervention, and after the removal of the twelve most abundant proteins, plasma proteins were separated by two-dimensional gel electrophoresis. Protein spots <66 kDa with a pI >4·3 visualised by silver staining were matched by two-dimensional imaging software. Within-subject changes in spots were compared between the treatment groups. Differentially affected spots were identified by matrix-assisted laser desorption ionisation-time of flight/time of flight MS and the human Swiss-Prot database. We found 23/681 abundant plasma protein spots, which were up- or down-regulated by the dietary treatment (P<0.05, q<0.30), and eighteen of these were identified. In each trout group, ten spots differed from those in subjects given the chicken meal, but only three of these were common, and only one spot differed between the two trout groups. In both groups, the affected plasma proteins were involved in biological processes such as regulation of vitamin A and haem transport, blood fibrinolysis and oxidative defence. Thus, regular fish intake affects the plasma proteome, and the changes may indicate novel mechanisms of effect.

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, University of Copenhagen
Authors: Rentsch, M. L. (Intern), Lametsch, R. (Ekstern), Bügel, S. (Ekstern), Jessen, F. (Intern), Lauritzen, L. (Ekstern)
Number of pages: 9
Pages: 699-707
Publication date: 2015
Main Research Area: Technical/natural sciences
Triton X-114 cloud point extraction to subfractionate blood plasma proteins for two-dimensional gel electrophoresis

A simple and reproducible procedure for enrichment of a plasma protein subfraction suitable for two-dimensional polyacrylamide gel electrophoresis (2DE) was developed, using a Triton X-114-based cloud point extraction (CPE). Appropriate conditions for such a CPE procedure were found by SDS-PAGE to be a plasma protein concentration of about 10mg/ml in 3% (w/v) Triton X-114. 2DE of proteins obtained by CPE of 400μl of human plasma revealed about 200 spots constituting a spot pattern very different from the pattern of total plasma. The CPE procedure only had a limited contribution to the technical variation. Identification of about 60 spots, representing only 22 proteins, revealed that several proteins in the obtained subfraction were present in more isoforms or modifications. Among these were apolipoproteins (A-1, D, E, L1, and M), haptoglobin-related protein, phosphatidylcholine-sterol acyltransferase, serum amyloid A, and serum paraoxonase/arylesterase 1, which are proteins of a hydrophobic nature, as in plasma they relate to lipoprotein particles. Thus, Triton X-114-based CPE is a simple plasma prefractionation tool, attractive for detailed 2DE studies of hydrophobic plasma proteins and their isoforms or modifications.

General information

State: Published
Organisations: National Food Institute, Research Group for Food Production Engineering, Novo Nordisk Foundation Center for Biosustainability, iLoop
Authors: Jessen, F. (Intern), Wulff, T. (Intern)
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Publication date: 2015
Main Research Area: Technical/natural sciences

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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.34 SJR 0.709 SNIP 0.746
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.728 SNIP 0.79 CiteScore 2.28
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.822 SNIP 0.848 CiteScore 2.37
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.854 SNIP 0.942 CiteScore 2.46
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.943 SNIP 0.969 CiteScore 2.53
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Antioxidant activity of Cod (Gadus morhua) protein hydrolysates: In vitro assays and evaluation in 5% fish oil-in-water emulsion

Cod protein hydrolysates were fractionated according to the molecular mass into three fractions of >5kDa, 3–5kDa and...

**General information**

- **State:** Published
- **Organisations:** National Food Institute, Division of Industrial Food Research, Marinova A/S
- **Authors:** Farvin, S. (Intern), Andersen, L. L. (Intern), Nielsen, H. H. (Intern), Jacobsen, C. (Intern), Jakobsen, G. (Ekstern), Johansson, I. (Ekstern), Jessen, F. (Intern)
- **Pages:** 326-334
- **Publication date:** 2014
- **Main Research Area:** Technical/natural sciences

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- **Volume:** 149
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  - BFI (2017): BFI-level 2
  - Web of Science (2017): Indexed yes
  - BFI (2016): BFI-level 2
  - Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
  - Web of Science (2016): Indexed yes
  - BFI (2015): BFI-level 2
Bioactive electrospun fish sarcoplasmic proteins as a drug delivery system

Nano-microfibers were made from cod (Gadus morhua) sarcoplasmic proteins (FSP) (M<sub>w</sub> < 200 kDa) using the electrospinning technique. The FSP fibers were studied by scanning electron microscopy, and the fiber morphology was found to be strongly dependent on FSP concentration. Interestingly, the FSP fibers were insoluble in water. However, when exposed to proteolytic enzymes, the fibers were degraded. The degradation products of the FSP fibers proved to be inhibitors of the diabetes-related enzyme DPP-IV. The FSP fibers may have biomedical applications, among others as a
delivery system. To demonstrate this, adipeptide (Ala-Trp) was encapsulated into the FSP fibers, and the release properties were investigated in gastric buffer and in intestinal buffer. The release profile showed an initial burst release, where 30% of the compound was released within the first minute, after which an additional 40% was released (still exponential) within the next 30 min (gastric buffer) or 15 min (intestinal buffer). The remaining 30% was not released in the timespan of the experiment.© 2014 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research
Authors: Stephansen, K. (Intern), Chronakis, I. S. (Intern), Jessen, F. (Intern)
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Main Research Area: Technical/natural sciences

Publication information
Journal: Colloids and Surfaces B: Biointerfaces
Volume: 122
ISSN (Print): 0927-7765
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 1.058 SNIP 1.302 CiteScore 4.42
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.083 SNIP 1.242 CiteScore 4.26
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.199 SNIP 1.554 CiteScore 4.53
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.251 SNIP 1.585 CiteScore 4.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.229 SNIP 1.344 CiteScore 3.74
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.031 SNIP 1.254 CiteScore 3.49
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.956 SNIP 1.152
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.868 SNIP 1.144
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.959 SNIP 1.125
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.854 SNIP 1.04
Scopus rating (2006): SJR 0.719 SNIP 0.855
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.707 SNIP 0.921
Scopus rating (2004): SJR 0.596 SNIP 0.824
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.696 SNIP 0.998
Web of Science (2003): Indexed yes
Characterization of process induced changes in matjes herring, using 2D gel electrophoresis

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Norwegian Institute of Food, Fisheries and Aquaculture Research
Authors: Skåra, T. (Ekstern), Jessen, F. (Intern), Nielsen, H. H. (Intern), Rotabakk, B. T. (Ekstern)
Number of pages: 1
Publication date: 2014
Event: Poster session presented at 44th WEFTA meeting, Bilbao, Spain.
Main Research Area: Technical/natural sciences
Electronic versions:
WEFTA2014Poster_2_.pdf
Source: PublicationPreSubmission
Source-ID: 93362465
Publication: Research - peer-review › Poster – Annual report year: 2014

Chilling and freezing of fish

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, National Institute of Aquatic Resources, Public Sector Consultancy
Authors: Jessen, F. (Intern), Nielsen, J. (Intern), Larsen, E. (Intern)
Pages: 33-61
Publication date: 2014

Host publication Information
Title of host publication: Seafood processing : Technology, quality and safety
Place of publication: Oxford
Publisher: Wiley-Blackwell
Editor: Boziaris, I. S.
ISBN (Print): 978-1-118-34621-1
Chapter: 3
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Book chapter – Annual report year: 2014

Discovery and characterization of novel bioactive peptides from marine secondary products
There is an increasing interest in bioactive peptides from marine secondary products, as they offer a great potential for incorporation into functional food and for medical purposes. Bioactive peptides from marine sources have been found to display a wide range of physiological functions including antioxidative, antihypertensive, antimicrobial, immunomodulatory, anticancer and diabetes 2 effects among others. However, majority of the research has been focusing on the peptides derived from hydrolysis with commercial industrial enzymes and the usefulness of these hydrolysates. It could be interesting whether digestion of fish secondary tissue with gastrointestinal proteases generates peptides, which also have these health promoting properties either in relation to gastrointestinal digestion or as an alternative to the use of industrial proteases. Furthermore, as a bioactive defense system against the bacterial load in the water, fish is expected to possess bio-components as small peptides. It could therefore be relevant whether these naturally occurring peptides exhibit other functional and health promoting bioactive properties. On this background the overall goal of the present PhD research was to discover and characterize novel bioactive peptides from marine secondary products. The research was divided into two more specific objectives in different parts. Part I was to investigate naturally occurring peptides for bioactivities as radical
Focus in nutritional science has turned towards components in, or added to, foods that may possess health beneficial activities beyond the classical nutritional value, namely functional food. Bioactive peptides are examples of such components. In vitro studies on bioactivities have mainly been executed without concerning subsequent digestion after intake and the aim of this work was hence to investigate how the in vitro antioxidative, antihypertensive and caspase activating activities of peptides are affected by digestion with gastrointestinal (GI) proteases. Five different fish protein hydrolysates were chosen to study the effect of in vitro digestion on bioactivity. The protein concentration decreased in all obtained hydrolysates, though hydrolysates from belly flap muscle showed a much stronger activity compared to skin hydrolysates. When fractionated by size exclusion chromatography, radical scavenging activity was found in all obtained hydrolysates, though hydrolysates from belly flap muscle showed a much stronger activity compared to skin hydrolysates. DPP-IV and ACE inhibiting activity was observed in nearly all fractionated hydrolysates, only in the pepsin generated hydrolysates no pronounced (or maybe none) DPP-IV inhibitory effect was observed. This is notable, as it was not in agreement with the obtained results from EC$_{50}$ values for the three-fold dilution curves. However, it is interesting, as it might be due to a synergy effect only present in the main hydrolysates, which vanishes when the hydrolysates are separated into fractions. Finally, mass spectrometry analysis of dominating compounds in active fractions from size exclusion chromatography showed that many compounds were present in several fractions. Currently it has not been possible to identify candidate bioactive compounds responsible for a certain bioactivity, as a more thorough analysis and characterization is required. Overall, this PhD research clearly showed a potential for bioactive peptides with health promoting properties from fish secondary tissues, especially when generated with gastrointestinal proteases, both in relation to gastrointestinal digestion and as an alternative to the use of industrial proteases.
Electrospun fish protein fibers as a biopolymer-based carrier – implications for oral protein delivery

Purpose: Protein-based electrospun fibers have emerged as novel nanostructured materials for tissue engineering and drug delivery due to their unique structural characteristics, biocompatibility and biodegradability. The aim of this study was to explore the use of electrospun fibers based on fish sarcoplasmic proteins as an oral delivery platform for biopharmaceuticals, using insulin as a model protein. Methods: Fish sarcoplasmic proteins (FSP) were isolated from fresh cod and electrospun into nanomicrofibers using insulin as a model payload. The morphology of FSP fibers was characterized using scanning electron microscopy (SEM), and the conformational stability of insulin was confirmed by circular dichroism (CD). The in vitro release and enzymatic degradation of encapsulated insulin was measured in different buffers and quantified using RP-HPLC. The permeability of released insulin across differentiated Caco-2 cell monolayers was followed by RP-HPLC and ELISA, and the transepithelial electrical resistance (TEER) was measured before and after the experiment. Cell viability was assessed by the MTS/PMS assay. Results: Insulin was encapsulated in the electrospun FSP fibers with high efficiency, high loading and without any effect on fiber morphology. Release of insulin in vitro was 75% after 3 h in simulated intestinal fluid. The secondary structure of insulin was preserved after release, and insulin functionality was confirmed by ELISA. Insulin permeability across Caco-2 cell monolayers was significantly enhanced when administered encapsulated in FSP fibers. The TEER was decreased after 4 h incubation, and no negative effect on cell viability was observed at any time. Conclusion: In this work we present electrospun FSP fibers as a novel oral drug delivery system for biopharmaceuticals. The electrospinning process did not affect the functionality of the encapsulated insulin and it provided controlled release kinetics. The epithelial permeability enhancing effect and biocompatibility of the FSP fibers provide evidence for further investigating protein-based electrospun nanofibers for delivery of proteins and peptides.
Species determination of pine nuts in commercial samples causing pine nut syndrome

Consumption of pine nuts from the species of Pinus armandii has been reported to cause dysgeusia, commonly known as pine mouth, or pine nut syndrome (PNS). However, the number of reports on pine nut consumptions of the different species and PNS is limited. This leaves open the possibility that other pine species than P. armandii could be involved in PNS as well. This study investigated 18 samples involved in PNS and received at the Danish Veterinary and Food Administration in 2011 through 2012. Samples were subjected to gas chromatographic analysis of fatty acids. The content of 11 individual fatty acids was used together with the diagnostic index and the sum of Δ5-fatty acids as diagnostic parameters. Diagnostic parameters from samples were then compared to reference material and literature data to determine the species. In a limited number of samples, the diagnostic parameters matched neither our reference materials nor literature data. However, the morphology, the fatty acid analysis, and externally obtained DNA sequencing data suggest a P. armandii subspecies or a variety. With these possible P. armandii subspecies, P. armandii was identified in all analyzed samples. The application of principal component analysis (PCA) to the data set showed a satisfactory separation of the majority of the 13 pine species included in the study.

General information

State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Danish Veterinary and Food Administration
Authors: Mikkelsen, A. Æ. (Ekstern), Jessen, F. (Intern), Ballin, N. Z. (Ekstern)
Pages: 19-25
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Control
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.86 SJR 1.462 SNIP 1.719
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.509 SNIP 1.72 CiteScore 3.65
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.389 SNIP 1.718 CiteScore 3.27
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.273 SNIP 1.745 CiteScore 3.14
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.264 SNIP 1.916 CiteScore 3.1
ISI indexed (2012): ISI indexed yes
The impact of students’ knowledge levels on the performances in a Design-Build project

Today an important part of teaching at the university level is group work relying on the Learning pyramid (NTL), where teaching one another is much more beneficial for students than lecturing. In group work students are either put in groups of their own choice (mostly relying on social behavior) or put into predesigned groups. In this paper we have reflected on the consequences of the composition of the predesigned group and tried to evaluate the outcome based on marks given for assignments delivered as reports and oral exams. Preliminary findings indicate that the composition of the group could have an influence on the intended learning outcome (ILO - here tested by marks and knowledge of student performance); and if group composition is highly diverse (by including both students with reflective learning and superficial learning), preliminary findings presented here indicate that the ILO can be lower compared with the best individual student in the group. This finding in some ways contradicts the common perception that both reflective and superficial students will benefit from working together, however, further observations on a larger number of students are needed to verify these initial findings.

General information
State: Published
Organisations: National Food Institute, Division of Food Microbiology, Division of Industrial Food Research, Office for Study Programmes and Student Affairs
Authors: Jensen, L. B. (Intern), Jessen, F. (Intern), Andersson, P. H. (Intern)
Number of pages: 6
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 10th International CDIO Conference
Place of publication: Barcelona, Spain
Authentication of Fish Products by Large-Scale Comparison of Tandem Mass Spectra

Authentication of food is a major concern worldwide to ensure that food products are correctly labeled in terms of which animals are actually processed for consumption. Normally authentication is based on species recognition by comparison of selected sequences of DNA or protein. We here present a new robust, proteome-wide tandem mass spectrometry method for species recognition and food product authentication. The method does not use or require any genome sequences or selection of tandem mass spectra but uses all acquired data. The experimental steps were performed in a simple, standardized workflow including protein extraction, digestion, and data analysis. First, a set of reference spectral libraries was generated using unprocessed muscle tissue from 22 different fish species. Query tandem mass spectrometry data sets from “unknown” fresh muscle tissue samples were then searched against the reference libraries. The number of matching spectra could unambiguously identify the origin of all fresh samples. A number of processed samples were also analyzed to further test the robustness and applicability of the method. The results clearly show that the method is also able to correctly identify heavily processed samples.
Scopus rating (2011): SJR 2.119 SNIP 1.267 CiteScore 5.12
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.93 SNIP 1.246
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.959 SNIP 1.206
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.993 SNIP 1.122
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.921 SNIP 1.108
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.761 SNIP 1.091
Scopus rating (2005): SJR 2.192 SNIP 1.409
Scopus rating (2004): SJR 2.298 SNIP 1.39
Scopus rating (2003): SJR 1.995 SNIP 0.944

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Source: dtu
Source-ID: n::oai:DTIC-ART:acs/391934615::34186
Publication: Research - peer-review › Journal article – Annual report year: 2013

Tandem mass spectrometry for species recognition and phenotyping in fish

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Division of Toxicology and Risk Assessment, Leiden University
Authors: Wulff, T. (Intern), Jessen, F. (Intern), Palmblad, M. (Ekstern), Nielsen, M. E. (Intern)
Pages: 71-74
Publication date: 2013

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Title of host publication: Farm animal proteomics2013 : Proceedings of the 4th Management Committee Meeting and 3rd Meeting of Working Groups 1, 2 & 3 of COST Action FA1002
Place of publication: The Netherlands
Publisher: Wageningen Academic Publishers
Editors: Almeida, A. D., Eckersall, D., Bencuurova, E., Dolinska, S., Mlynarcik, P., Vincova, M., Bhide, M.
ISBN (Print): 978-90-8686-222-1
Main Research Area: Technical/natural sciences
Conference: 4th Management Committee Meeting and 3rd Meeting of Working Groups 1, 2 & 3 of COST Action FA1002, Kosice, Slovakia, 25/04/2013 - 25/04/2013

Relations
Projects:
Tandem mass spectrometry for species recognition and phenotyping in fish
Source: dtu
Source-ID: u::7888
Publication: Research - peer-review › Article in proceedings – Annual report year: 2013

Comparative analysis of inflamed and non-inflamed colon biopsies reveals strong proteomic inflammation profile in patients with ulcerative colitis

Background: Accurate diagnostic and monitoring tools for ulcerative colitis (UC) are missing. Our aim was to describe the proteomic profile of UC and search for markers associated with disease exacerbation. Therefore, we aimed to characterize specific proteins associated with inflamed colon mucosa from patients with acute UC using mass spectrometry-based proteomic analysis. Methods: Biopsies were sampled from rectum, sigmoid colon and left colonic flexure from twenty patients with active proctosigmoiditis and from four healthy controls for proteomics and histology. Proteomic profiles of whole colonic biopsies were characterized using 2D-gel electrophoresis, and peptide mass fingerprinting using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) was
applied for identification of differently expressed protein spots. Results: A total of 597 spots were annotated by image analysis and 222 of these had a statistically different protein level between inflamed and non-inflamed tissue in the patient group. Principal component analysis clearly grouped non-inflamed samples separately from the inflamed samples indicating that the proteomic signature of colon mucosa with acute UC is strong. Totally, 43 individual protein spots were identified, including proteins involved in energy metabolism (triosephosphate isomerase, glycerol-3-phosphate-dehydrogenase, alpha enolase and L-lactate dehydrogenase B-chain) and in oxidative stress (superoxide dismutase, thioredoxins and selenium binding protein). Conclusions: A distinct proteomic profile of inflamed tissue in UC patients was found. Specific proteins involved in energy metabolism and oxidative stress were identified as potential candidate markers for UC.

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Aarhus University, Viborg Regional Hospital
Authors: Poulsen, N. A. (Ekstern), Andersen, V. (Ekstern), Møller, J. C. (Ekstern), Møller, H. S. (Ekstern), Jessen, F. (Intern), Purup, S. (Ekstern), Larsen, L. B. (Ekstern)
Number of pages: 11
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: B M C Gastroenterology
Volume: 12
Issue number: 76
ISSN (Print): 1471-230X
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 1.084 SNIP 1.039 CiteScore 2.62
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.025 SNIP 1.086 CiteScore 2.68
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.083 SNIP 1.155 CiteScore 2.9
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.036 SNIP 1.139 CiteScore 2.78
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.033 SNIP 1.252 CiteScore 2.89
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.931 SNIP 1.119 CiteScore 2.88
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.046 SNIP 1.202
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.972 SNIP 1.049
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.765 SNIP 0.924
Scopus rating (2007): SJR 0.779 SNIP 0.894
Scopus rating (2006): SJR 0.74 SNIP 0.926
Scopus rating (2005): SJR 0.567 SNIP 0.878
Scopus rating (2004): SJR 0.419 SNIP 0.704
Scopus rating (2003): SJR 0.323 SNIP 0.604
Scopus rating (2002): SJR 0.18 SNIP 0.093
Original language: English
Electronic versions: 7.pdf
Dietary Tools To Modulate Glycogen Storage in Gilthead Seabream Muscle: Glycerol Supplementation

The quality and shelf life of fish meat products depend on the skeletal muscle’s energetic state at slaughter, as meat decomposition processes can be exacerbated by energy depletion. In this study, we tested dietary glycerol as a way of replenishing muscle glycogen reserves of farmed gilthead seabream. Two diets were tested in duplicate (n = 42/tank). Results show 5% inclusion of crude glycerol in gilthead seabream diets induces increased muscle glycogen, ATP levels and firmness, with no deleterious effects in terms of growth, proximate composition, fatty acid profile, oxidative state, and organoleptic properties (aroma and color). Proteomic analysis showed a low impact of glycerol-supplementation on muscle metabolism, with most changes probably reflecting increased stress coping capacity in glycerol-fed fish. This suggests inclusion of crude glycerol in gilthead seabream diets (particularly in the finishing phase) seems like a viable strategy to increase glycogen deposition in muscle without negatively impacting fish welfare and quality.

General information
State: Published
Organisations: Department of Systems Biology, National Food Institute, Division of Industrial Food Research, University of Algarve, University of Porto, Unity of Innovation of Fish and Aquaculture Products
Authors: Silva, T. S. (Ekstern), Matos, E. (Ekstern), Cordeiro, O. D. (Ekstern), Colen, R. (Ekstern), Wulff, T. (Intern), Sampaio, E. (Ekstern), Sousa, V. (Ekstern), Valente, L. M. P. (Ekstern), Gonçalves, A. (Ekstern), Silva, J. M. G. (Ekstern), Bandarra, N. (Ekstern), Nunes, M. L. (Ekstern), Dinis, M. T. (Ekstern), Dias, J. (Ekstern), Jessen, F. (Intern), Rodrigues, P. M. (Ekstern)
Pages: 10613–10624
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 60
Issue number: 42
ISSN (Print): 0021-8561
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
Effects of Preslaughter Stress Levels on the Post-mortem Sarcoplasmic Proteomic Profile of Gilthead Seabream Muscle

Fish welfare is an important concern in aquaculture, not only due to the ethical implications but also for productivity and quality-related reasons. The purpose of this study was to track soluble proteome expression in post-mortem gilthead seabream muscle and to observe how preslaughter stress affects these post-mortem processes. For the experiment, two groups of gilthead seabream (n = 5) were subjected to distinct levels of preslaughter stress, with three muscle samples being taken from each fish. Proteins were extracted from the muscle samples, fractionated, and separated by 2DE. Protein identification was performed by MALDI-TOF-TOF MS. Analysis of the results indicates changes on several cellular pathways, with some of these changes being attributable to oxidative and proteolytic activity on sarcoplasmic proteins, together with leaking of myofibrillar proteins. These processes appear to have been hastened by preslaughter stress, confirming that it induces clear post-mortem changes in the muscle proteome of gilthead seabream.

General information
State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, National Food Institute, Division of Industrial Food Research, University of Algarve
Authors: Silva, T. S. (Intern), Cordeiro, O. D. (Ekstern), Matos, E. D. (Ekstern), Wulff, T. (Intern), Dias, J. P. (Ekstern), Jessen, F. (Intern), Rodrigues, P. M. (Ekstern)
Pages: 9443-9453
Publication date: 2012
Main Research Area: Technical/natural sciences
Changing the protein source of fish feed from fish meal to alternative sources of protein will affect traits such as fish growth, quality, and feed utilization. The present investigation was initiated to introduce a two-dimensional gel electrophoresis based proteomic workflow as a tool to investigate feed effects on fish by analyzing protein changes in the fish gut. The workflow was used to study the effect of substituting fish meal in fish feed by alternative sources of protein. Rainbow trout divided into five groups were fed for 72 days with feeds varying in protein composition. By two-dimensional gel electrophoresis proteins extracted from the pyloric ceca were separated, making it possible to measure the abundance of more than 440 protein spots. The expression of 41 protein spots was found to change due to differences in feed composition. By mass spectrometry 31 of these proteins were identified, including proteins involved in digestion (trypsinogen, carboxylic ester hydrolase, and aminopeptidase). The many expression changes indicated that the trout, when adapting to differences in feed formulation, alter the protein composition of the gut.

**Proteome Analysis of Pyloric Ceca: A Methodology for Fish Feed Development?**

**General information**

State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, National Food Institute, Division of Industrial Food Research, University of Southern Denmark, Aller Aqua A/S
Authors: Wulff, T. (Intern), Petersen, J. (Ekstern), Nørrelykke, M. R. (Ekstern), Jessen, F. (Intern), Nielsen, H. H. (Intern)
Pages: 8457-8464
Publication date: 2012
Main Research Area: Technical/natural sciences

**Publication information**

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BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
ISI indexed (2011): ISI indexed yes
Proteomics as a tool to understand fish stress in aquaculture

General information
State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, National Food Institute, Division of Industrial Food Research, Centro de Ciências do Mar do Algarve
Pages: 198-200
Publication date: 2012

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Title of host publication: Farm animal proteomics : Proceedings of the 3rd Managing Committee meeting and 2nd Meeting of Working Groups 1, 2 & 3 of COST Action FA 1002
Place of publication: The Netherlands
Publisher: Wageningen Academic Publishers
Editors: Rodrigues, P., Eckersall, D., de Almeida, A.
ISBN (Print): 978-90-8686-195-8
Main Research Area: Technical/natural sciences
PROTEOMICS in aquaculture: Applications and trends

Over the last forty years global aquaculture presented a growth rate of 6.9% per annum with an amazing production of 52.5 million tonnes in 2008, and a contribution of 43% of aquatic animal food for human consumption. In order to meet the world's health requirements of fish protein, a continuous growth in production is still expected for decades to come.

Aquaculture is, though, a very competitive market, and a global awareness regarding the use of scientific knowledge and emerging technologies to obtain a better farmed organism through a sustainable production has enhanced the importance of proteomics in seafood biology research. Proteomics, as a powerful comparative tool, has therefore been increasingly used over the last decade to address different questions in aquaculture, regarding welfare, nutrition, health, quality, and safety. In this paper we will give an overview of these biological questions and the role of proteomics in their investigation, outlining the advantages, disadvantages and future challenges. A brief description of the proteomics technical approaches will be presented. Special focus will be on the latest trends related to the aquaculture production of fish with defined nutritional, health or quality properties for functional foods and the integration of proteomics techniques in addressing this challenging issue. This article is part of a Special Issue entitled: Farm animal proteomics.
Quality of frozen fish

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research
Authors: Goncalves, A. A. (Ekstern), Nielsen, J. (Intern), Jessen, F. (Intern)
Pages: 479-509
Publication date: 2012

Host publication information
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Publisher: Wiley-Blackwell
Edition: 2
ISBN (Print): 978-0470958322
Chapter: 31
Main Research Area: Technical/natural sciences
Electronic versions:
Quality of frozen seafood Goncalves Jette Flemming.pdf

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Book chapter
Source: dtu
Source-ID: u::5860
Publication: Research - peer-review › Book chapter – Annual report year: 2012

Standardized and simple sub-fractionation of human plasma reveals enrichment of many low abundant hydrophobic proteins

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Department of Systems Biology
Authors: Jessen, F. (Intern), Wulff, T. (Intern)
Number of pages: 1
Publication date: 2012
Event: Poster session presented at 9th Siena Meeting From Genome to Proteome, Siena, Italy.
Main Research Area: Technical/natural sciences
Electronic versions:
FLJ_Siena_2012_poster draft2.pdf
Source: dtu
Source-ID: u::5861
Time-dependent changes in protein expression in rainbow trout muscle following hypoxia

Adaptation to hypoxia is a complex process, and individual proteins will be up- or down-regulated in order to address the main challenges at any given time. To investigate the dynamics of the adaptation, rainbow trout (Oncorhynchus mykiss) was exposed to 30% of normal oxygen tension for 1, 2, 5 and 24h respectively, after which muscle samples were taken. The successful investigation of numerous proteins in a single study was achieved by selectively separating the sarcoplasmic proteins using 2-DE. In total 46 protein spots were identified as changing in abundance in response to hypoxia using one-way ANOVA and multivariate data analysis. Proteins of interest were subsequently identified by MS/MS following tryptic digestion. The observed regulation following hypoxia in skeletal muscle was determined to be time specific, as only a limited number of proteins were regulated in response to more than one time point. The cellular response to hypoxia included regulation of proteins involved in maintaining iron homeostasis, energy levels and muscle structure. In conclusion, this proteome-based study presents a comprehensive investigation of the expression profiles of numerous proteins at four different time points. This increases our understanding of timed changes in protein expression in rainbow trout muscle following hypoxia.

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Food Institute, Division of Industrial Food Research, National Institute of Aquatic Resources, Section for Aquaculture, Technical University of Denmark
Authors: Wulff, T. (Intern), Jokumsen, A. (Intern), Højrup, P. (Forskerdatabase), Jessen, F. (Intern)
Pages: 2342-2351
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Proteomics
Volume: 75
Issue number: 8
ISSN (Print): 1874-3919
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.05 SJR 1.383 SNIP 1.055
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.495 SNIP 1.14 CiteScore 4.09
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.353 SNIP 1.119 CiteScore 4.02
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.306 SNIP 1.024 CiteScore 4.23
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.227 SNIP 1.168 CiteScore 4.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.224 SNIP 1.196 CiteScore 4.81
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.016 SNIP 1.056
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.77 SNIP 0.943
Vegetable based fish feed changes protein expression in muscle of rainbow trout (Oncorhynchus mykiss)

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Department of Systems Biology, Enzyme and Protein Chemistry, Technical University of Denmark
Authors: Jessen, F. (Intern), Wulff, T. (Intern), Bach Mikkelsen, J. (Ekstern), Hyldig, G. (Intern), Nielsen, H. H. (Intern)
Pages: 134-137
Publication date: 2012

Host publication information
Title of host publication: Farm animal proteomics : Proceedings of the 3rd Managing Committee meeting and 2nd Meeting of Working Groups 1, 2 & 3 of COST Action FA 1002
Place of publication: The Netherlands
Publisher: Wageningen Academic Publishers
Editors: Rodrigues, P., Eckersall, D., de Almeida, A.
ISBN (Print): 978-90-8686-195-8
Main Research Area: Technical/natural sciences
Conference: 3rd Managing Committee Meeting and 2nd Meeting of Working Group 1, 2 & 3 of COST Action FA1002, Algarve, Portugal, 12/04/2012 - 12/04/2012
Publication: Research - peer-review › Article in proceedings – Annual report year: 2012

Report from workshop on Bioactive peptides from aquatic raw materials: Copenhagen, 2 March 2010

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research
Authors: Andersen, L. L. (Intern), Nielsen, H. H. (Intern), Jessen, F. (Intern)
Number of pages: 133
Publication date: Dec 2011

Publication information
Place of publication: Søborg
Publisher: The National Food Institute, Technical University of Denmark
Edition: 1
ISBN (Print): 978-87-92763-07-5
Original language: English
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2011
Antioxidant Activity of Fish Protein Hydrolysates in in vitro Assays and in Oil-in-Water Emulsions.
The aim of this study was to screen different protein hydrolysates with respect to their antioxidative properties in order to select the most promising extracts for further evaluation in oil-in-water emulsions. Three fractions of protein hydrolysates (Crude, >5kDa and 5kDa, 3-5kDa and

General information
State: Published
Organisations: Division of Industrial Food Research, National Food Institute
Authors: Farvin, S. (Intern), Andersen, L. L. (Intern), Jacobsen, C. (Intern), Nielsen, H. H. (Intern), Jessen, F. (Intern)
Publication date: 2011
Event: Abstract from 102nd AOCS Annual Meeting & Expo, Cincinnati, Ohio, USA, .
Main Research Area: Technical/natural sciences
Electronic versions:
AOCS.pdf
Source: orbit
Source-ID: 312475
Publication: Research › Conference abstract for conference – Annual report year: 2011

Dietary Tools To Modulate Glycogen Storage In Fish Muscle: A Proteomic Assessment
Post-mortem flesh deterioration is dependent on the energy reserves present at the time of death. Early depletion of muscle glycogen leads to the buildup of lactate and to the early onset of rigor mortis, resulting in the activation of endogenous proteases and the degradation of myofibrillar proteins, and consequent muscle softening. The purpose of this study was to modulate the energy status of the muscle at the time of death through the use of dietary muscle buffering compounds, namely glycerol and maslinic acid. Four fish groups of gilthead seabream (in duplicate) were fed for three months with four different diets. The four diets were obtained by starting from a commercial diet formulation and applying a 2×2 factorial design, with two levels of glycerol supplementation (0 and 5%) and two levels of maslinic acid supplementation (0 and 0.025%). The diets were formulated to be isonitrogenous and isolipidic. Fish were slaughtered by immersion in ice-salt water slurry and muscle samples were immediately obtained from three fish of each tank, for a total of six muscle samples per treatment. Sarcoplasmic proteins were extracted from each muscle sample, separated/quantified by 2D-DIGE and identified by peptide fragment fingerprinting using MALDI-TOF MS. Preliminary analysis of the results shows an effect of the diets on muscle parameters such as measured pH and onset of rigor mortis. At the proteome level, the addition of glycerol and maslinic acid to the diets seemed to have affected the abundance of proteins related to oxidative stress (HSC70, HSC71, peroxiredoxin, transferrin), aldehyde toxification (ALDH1A2, ALDH6A1, ALDH7A1), energy homeostasis (adenylate kinase, nucleoside-diphosphate kinase), cytoskeleton (cofilin-2) and signalling (phosphohistidine phosphatase).

General information
State: Published
Organisations: Division of Industrial Food Research, National Food Institute, Technical University of Denmark, University of Algarve, Unity of Innovation of Fish and Aquaculture Products
Authors: Silva, T. S. (Ekstern), Matos, E. (Ekstern), Cordeire, O. (Ekstern), Wulff, T. (Intern), Goncalves, A. (Ekstern), Nunes, M. L. (Ekstern), Dias, J. (Ekstern), Jessen, F. (Intern), Rodrigues, P. M. (Ekstern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Electronic versions:
prod21323256160507.GIA2011-abstract-Tome_Silva.pdf
Links:
http://www.gia2011.com/
Source: orbit
Source-ID: 313952
Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2011

Differences in fish feed composition influence protein expression in the pyloric caeca in rainbow trout

General information
State: Published
Organisations: Division of Industrial Food Research, National Food Institute, Danish Technological Institute
Authors: Wulff, T. (Intern), Petersen, J. (Ekstern), Nørrelykke, M. R. (Ekstern), Jessen, F. (Intern), Nielsen, H. H. (Intern)
Publication date: 2011
Event: Poster session presented at Proteomic Forum, Berlin, Germany, .
Main Research Area: Technical/natural sciences
Electronic versions:
Effect of a dietary supplementation of glycerol and maslinic acid on the muscle proteome of gilthead seabream

General information
State: Published
Organisations: Division of Industrial Food Research, National Food Institute, Universidade do Algarve, Technical University of Denmark
Authors: Silva, T. S. (Ekstern), Matos, E. (Ekstern), Cordeiro, O. (Ekstern), Wulff, T. (Intern), Dias, J. (Ekstern), Jessen, F. (Intern), Rodrigues, P. (Ekstern)
Publication date: 2011
Event: Poster session presented at Protemic Forum, Berlin, Germany.
Main Research Area: Technical/natural sciences

Feed based on vegetable materials changes the muscle proteome of the carnivore rainbow trout
Feed production for aquaculture of carnivore fish species relies heavily on protein and lipid from the limited resources of wild fish and other sea living organisms. Thus the development of alternative feeds replacing fish meal and oil with components of vegetable origin is important for a sustainable production of fish from aquaculture. However, such a change in feed will have an effect on the fish composition and metabolism and may also affect eating quality as well as different health and nutritional properties. A proteomic approach was taken to compare the muscle protein profile of rainbow trout fed two different diets identical in protein and oil content, but with diet C based on fish meal and oil and diet V based on rapeseed oil and vegetable proteins. In addition to the proteomic investigation the textural properties of the fish were analysed by sensory profiling. Protein expression profiles were achieved by 2-dimensional gel electrophoresis. The result showed that 40 spots were significantly (p

Vækst og kvalitet af motioneret regnbueørred

General information
State: Published
Organisations: Section for Aquaculture, National Institute of Aquatic Resources, Division of Industrial Food Research, National Food Institute
Authors: Rasmussen, R. S. (Intern), Oksembjerg, N. (Ekstern), Hyldig, G. (Intern), Jacobsen, C. (Intern), Jessen, F. (Intern), Nielsen, H. H. (Intern)
Number of pages: 38
Publication date: 2011
Effect of Protein Hydrolysates on Pancreatic Cancer Cells

Effect of Fish Protein Hydrolysates on Pancreatic Cancer Cells Carlo G. Ossum1, Lisa Lystbæk Andersen2, Henrik Hauch Nielsen2, Else K. Hoffmann1, and Flemming Jessen2
1University of Copenhagen, Department of Biology, Denmark, 2Technical University of Denmark (DTU), National Food Institute, Denmark Corresponding author: Carlo G. Ossum (cgossum@gmail.com) A large number of bioactive peptides have been identified in and isolated from various food sources. Milk seems to be a particularly rich source but also different fish species have been found to yield bioactive peptides. Bioactive peptides, usually consisting of 3 to 20 amino acids, can be released from proteins upon degradation by proteolytic enzymes, e.g. in the intestinal tract. The numerous described bioactivities include antihypertensive, anticancerous, antimicrobial, and immunomodulating effects. Here, we investigate the effect of fish protein hydrolysates obtained by enzymatic hydrolysis on cancer cell proliferation. Skin and belly flap muscle from trout were hydrolysed with the unspecific proteases Alcalase, Neutrase, or UE1 (all from Novozymes, Bagsværd, Denmark) to a hydrolysis degree of 1-15%. The hydrolysates were tested for biological activities affecting cell proliferation and ability to modulate caspase activity in pancreatic cancer cells COLO357 and BxPC-3 in vitro. A number of the hydrolysates showed caspase promoting activity; in particular products containing muscle tissue, i.e. belly flap, were able to stimulate caspase activity. Selected hydrolysis products were further fractionated by ultrafiltration into molecular sizes above and below 5 kDa and their activity and dose-dependence was tested.

Post-mortem sarcoplasmic proteomic profile of gilthead seabream is affected by pre-slaughter stress levels.

Purification and Characterization of Bioactive Peptides from Fish Protein Hydrolysates
Reproducibility of a fractionation procedure for fish muscle proteomics

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Division of Seafood Research, Centro de Ciências do Mar do Algarve
Authors: Silva, T. S. (Intern), Cordeiro, O. (Ekstern), Jessen, F. (Intern), Dias, J. (Ekstern), Rodrigues, P. M. (Ekstern)
Pages: 8-13
Publication date: 2010
Main Research Area: Technical/natural sciences

**Time-dependent effect of pre-slaughter stress levels on the post-mortem sarcoplasmic proteomic profile of Sparus aurata muscle**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Division of Seafood Research, National Food Institute
Authors: Silva, T. S. (Intern), Dias, J. (Ekstern), Matos, E. (Ekstern), Wulff, T. (Intern), Jessen, F. (Intern), Rodrigues, P. (Ekstern)
Publication date: 2010
Event: Poster session presented at 6th Symposium of the Danish Proteomics Society, Odense, Denmark.
Main Research Area: Technical/natural sciences
Using a cross-model loadings plot to identify protein spots causing 2-DE gels to become outliers in PCA

The multivariate method PCA is an exploratory tool often used to get an overview of multivariate data, such as the quantified spot volumes of digitized 2-DE gels. PCA can reveal hidden structures present in the data, and thus enables identification of potential outliers and clustering. Based on PCA, we here present an approach for identification of protein spots causing 2-DE gels to become outliers. The approach can potentially obviate analytical exclusion of entire 2-DE gels.
Wound healing effect on tissue composition: facing interindivdual variability

General information
State: Published
Organisations: Division of Seafood Research, National Food Institute
Authors: Wulff, T. (Intern), Jessen, F. (Intern), Nielsen, M. E. (Intern)
Publication date: 2010
Main Research Area: Technical/natural sciences
Source-ID: 262682
Publication: Research - peer-review › Journal article – Annual report year: 2010

2 D gel based analysis of biological variability of the human plasma proteome

Human blood plasma is a valuable specimen for the biomarker discovery process, since it is easily accessible and contains proteins that are synthesised, secreted or lost from cells and tissue. In this way, changes in plasma proteome reflect the current state of the organism. The analysis of plasma proteome is yet challenging due to the huge dynamic range of protein abundance. When evaluating a potential biomarker, stable basal level of the protein is needed before it can be considered a functional biomarker. However, basal level differences of plasma proteins are naturally occurring between individuals and within an individual changes will also happen over time (e.g. after meal intake). Thus, the aim of the present study was to examine the inter-individual variability of plasma protein levels in humans after meal intake. Five subjects consumed three single meals in a randomised order separated by one-week interval. Blood samples were drawn before the meal intake and five times during 24 hours for proteome analysis. Plasma was fractionated by use of IgY-12 spin column depleting the 12 highly abundant proteins and further processed for two-dimensional gel electrophoresis. The plasma proteome profiling was visualized by silver staining and analysed by the software Samespots. The inter-individual variability of the plasma proteome was demonstrated by multivariate data analysis (principal component analysis and partial least squares reression) on normalised spot volumes.

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Rentsch, M. L. (Intern), Jessen, F. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Source-ID: 252796
Publication: Research › Poster – Annual report year: 2009

Contribution of cathepsins B, L and D to muscle protein profiles correlated with texture in rainbow trout (Oncorhynchus mykiss)
Post-mortem softening of fish tissue often results in low yield and decreased product quality. In this study, proteolytic profiles of trout stored 5 days oil ice were obtained by SDS-PAGE. The link between protein hand intensities and firmness of trout fillets was examined through a correlation Study. In parallel, trout extracts were incubated with cathepsin B, cathepsin L and cathepsin D, alone or in combination, in order to evaluate the effect of each cathepsin on the texture-related proteins. Proteins from both myofibrillar (alpha-actinin, actin, MLC1, MLC2. and N-terminal 70 kDa MHC fragment) and sarcoplastic (glycogen phosphorylase, creatine kinase, and TPI) fractions correlated closely with firmness. Cathepsins D, B and L affected, respectively, 10, 9 and 4 out of the 17 protein bands correlating with firmness, and most changes induced by cathepsin D were unfavourable to firmness. This implies that cathepsin D is likely to be involved in textural change of trout, due to breakdown of the muscle structure.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Authors: Godiksen, H. (Intern), Morzel, M. (Ekstern), Hyldig, G. (Intern), Jessen, F. (Intern)
Pages: 889-896
Publication date: 2009
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Food Chemistry
Volume: 113
Issue number: 4
ISSN (Print): 0308-8146
Ratings:
- BFI (2018): BFI-level 2
- BFI (2017): BFI-level 2
- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 2
- Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
  - Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 2
- Scopus rating (2015): SJR 1.597 SNIP 1.962 CiteScore 4.31
  - Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 2
- Scopus rating (2014): SJR 1.595 SNIP 2.027 CiteScore 3.92
  - Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 2
- Scopus rating (2013): SJR 1.548 SNIP 2.069 CiteScore 3.87
  - ISI indexed (2013): ISI indexed yes
  - Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 2
- Scopus rating (2012): SJR 1.805 SNIP 2.357 CiteScore 3.98
  - ISI indexed (2012): ISI indexed yes
  - Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 2
- Scopus rating (2011): SJR 1.909 SNIP 2.395 CiteScore 4.17
  - ISI indexed (2011): ISI indexed yes
  - Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 2
- Scopus rating (2010): SJR 1.965 SNIP 2.261
  - Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 2
- Scopus rating (2009): SJR 1.776 SNIP 2.024
  - Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 2
- Scopus rating (2008): SJR 1.488 SNIP 1.703
  - Web of Science (2008): Indexed yes
Multivariate data analysis of 2 DE data: Time dependent changes in protein expression in rainbow trout following hypoxia

In the last decade there has been a growing understanding of the health benefits of fish consumption. This has lead to an increased interest in studies examining which parameters will affect eating quality of fish grown in fish farms. Especially increased softening of fish muscle is a major problem since it significantly reduces the quality of the major edible part of the fish. One important stressor affecting quality is hypoxia which will occur in fish farms, when the trout is collected for transport before slaughter. In order to explore the biochemical mechanisms responsible for the changes seen in trout muscle following hypoxia, a proteome study was conducted. This will greatly aid the aquaculture industry when evaluating the type of stressors mostly affecting food quality, allowing the industry to optimise handling of the rainbow trout accordingly. In the present study a number of rainbow trout were kept in tanks where hypoxia, (30% of normal oxygen) when introduced, was the only stressor. The fish were sacrificed at different time points (1, 2, 5 and 24 hours) after the onset of hypoxia and muscle samples were taken from each individual fish. Protein expression profiles of the samples were achieved by 2-DE. Protein spots, which individually or in combination with other spots varied according to hypoxia were found by multivariate data analysis (partial least squares regression) on group scaled data (normalised spot volumes) followed by selection of significant spots by jack-knifing. Tandem mass spectrometry was used to identify protein spots of interest.

General information
State: Published
Organisations: National Food Institute, Section for Aquaculture, National Institute of Aquatic Resources
Authors: Wulff, T. (Intern), Jokumsen, A. (Intern), Jessen, F. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 255870
Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2009

On the Reproducibility of a Fractionation Procedure for Fish Muscle Proteomics

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Rodrigues, P. (Ekstern), Silva, T. S. (Intern), Jessen, F. (Intern), Dias, J. (Ekstern)
Pages: S19-S19
Publication date: 2009
Main Research Area: Technical/natural sciences
PEPFISH: Utilisation of Bioactive Peptides from Fish Processing – Upgrading the Value of Secondary Products

General information
State: Published
Organisations: National Food Institute, Novozymes A/S, University of Tromsø, Lund University, Marinova A/S, Biofac A/S, Copenhagen University Hospital, University of Copenhagen
Publication date: 2009
Event: Poster session presented at 3rd Joint Trans-Atlantic Fisheries Technology Conference, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 255920
Publication: Research › Poster – Annual report year: 2009

Purification and Characterization of Peptides from Fish Protein Hydrolysates

General information
A molecular approach to pre-harvest impact on post-harvest quality of trout

Fish meat quality is influenced by many biological and physical factors like e.g. rearing, feeding, slaughtering, processing and storage. Observations from the commercial aquaculture industry indicate that infections in e.g. salmon caused by Moritella viscosus or Pancreas Disease (PD) results in downgrading of fish quality and subsequent a reduction in prize. Despite this, the impact of infectious diseases on the meat quality and the mechanisms behind are poorly investigated. Wound repair is a dynamic, interactive response to tissue injury that involves a complex interaction and cross talk of various cell types, extracellular matrix molecules, soluble mediators and cytokines. In order to describe the molecular mechanisms and processes of wound repair, a panel of genes covering immunological factors and tissue regeneration were used to measure changes at the mRNA level following mechanical tissue damage in rainbow trout (Oncorhynchus mykiss). Needle disrupted muscle tissue was sampled at different time points and subject to real-time RT-PCR for measuring the expression of the genes IL-1ß, IL-8, IL-10, TGF-ß, Myostatin-1ab, MMP-2, CTGF, Collagen-1alfa, VEGF, iNOS, Arg-2 and FGF. The results showed an initial phase with up-regulation of immune-related genes followed by a regenerative phase with regulation of genes coding for muscle growth and synthesis of connective tissue.

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Nielsen, M. E. (Intern), Hyldig, G. (Intern), Nielsen, H. H. (Intern), Jessen, F. (Intern), Ingerslev, H. (Intern)
Publication date: 2008
Event: Poster session presented at International Conference on Fish Diseases and Fish Immunology, Reykjavik, Iceland.
Main Research Area: Technical/natural sciences
A molecular approach to pre-harvest impact on post-harvest quality of trout

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Section for Aquatic Process and Product Technology
Publication date: 2008
Main Research Area: Technical/natural sciences
Source: orbit
Publication: Research › Paper – Annual report year: 2008

A short-term intervention trial with selenate, selenium-enriched yeast and selenium-enriched milk: effects on oxidative defence regulation

General information
State: Published
Organisations: Division of Toxicology and Risk Assessment, National Food Institute, Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources, Division of Food Chemistry
Publication date: 2008
Main Research Area: Technical/natural sciences
Source: orbit
Publication: Research › Poster – Annual report year: 2008

Combination of statistical approaches for analysis of 2-DE data gives complementary results

Five methods for finding significant changes in proteome data have been used to analyze a two-dimensional gel electrophoresis data set. We used both univariate (ANOVA) and multivariate (Partial Least Squares with jackknife, Cross Model Validation, Power-PLS and CovProc) methods. The gels were taken from a time-series experiment exploring the changes in metabolic enzymes in bovine muscle at five time-points after slaughter. The data set consisted of 1377 protein spots, and for each analysis, the data set were preprocessed to fit the requirements of the chosen method. The generated results were one list from each analysis method of proteins found to be significantly changed according to the experimental design. Although the number of selected variables varied between the methods, we found that this was dependent on the specific aim of each method. CovProc and P-PLS focused more on getting the minimum necessary subset of proteins to explain properties of the samples. These methods ended up with less selected proteins. There was also a correlation between level of significance and frequency of selection for the selected proteins.

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Center for Microbial Biotechnology, Department of Systems Biology, Enzyme and Protein Chemistry
Pages: 5119-5124
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Proteome Research
Volume: 7
Issue number: 12
ISSN (Print): 1535-3893
Comparison of two anoxia models in rainbow trout cells by a 2-DE and MS/MS-based proteome approach

In the literature, a variety of ways have been used to obtain anoxia, and most often results are compared between studies without taking into consideration how anoxia has been obtained. Here, we provide a comprehensive study of two types of anoxia, using a proteomics approach to compare changes in protein expression. The two investigated situations were 30 min of chemical anoxia (10 mM NaN3) followed by reoxygenation overnight (CR) and 2 h of N-2-induced anoxia (achieved by flushing with N-2) followed by reoxygenation. overnight (NR), after which samples were resolved by 2-DE. Forty-five protein spots changed their abundance in response to CR and 35 protein spots changed their abundance in response to NR, but only six proteins changed their abundance in response to both stimuli. By the means of MS/MS, 40 protein spots were identified including proteins involved in processes like cell protection and protein synthesis. It was also revealed that the level of a number of keratins was down-regulated. This study therefore provides a valuable comparison of two different anoxia models and shows that great care should be taken when comparing the effects of anoxia in studies that have used different types and durations of anoxia.
General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Wulff, T. (Intern), Hoffmann, E. (Ekstern), Roepstorff, P. (Ekstern), Jessen, F. (Intern)
Pages: 2035-2044
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Proteomics
Volume: 8
Issue number: 10
ISSN (Print): 1615-9853
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.85 SJR 1.492 SNIP 0.89
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.464 SNIP 0.978 CiteScore 3.7
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.436 SNIP 0.981 CiteScore 3.73
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.48 SNIP 0.985 CiteScore 3.88
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.489 SNIP 1.099 CiteScore 4.1
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.677 SNIP 1.182 CiteScore 4.49
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.494 SNIP 1.127
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.496 SNIP 1.122
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.573 SNIP 1.126
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.84 SNIP 1.201
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.968 SNIP 1.287
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.921 SNIP 1.392
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.803 SNIP 1.341
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.952 SNIP 1.193
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.214 SNIP 1.004
Effects of tetracycline administration on the proteomic profile of pig muscle samples (L. dorsi)

Effect of tetracycline (TC) administration on the proteomic profile of pig muscle was evaluated by 2D electrophoresis and MALDI-TOF mass spectrometry. The TC content at slaughter was determined in L. dorsi samples by HPLC-DAD. Mean residual concentration of TC in the muscle of treated animals, calculated as the sum of TC and epi-TC was 126.3 μg/kg, indicating a rapid elimination of TC in this tissue. Several differential spots (n = 54, p <0.05) were observed in protein profiles from control and treated animals. MALDI-TOF identification gave a positive match for 5 differential spots, that is, glycerol-3-phosphate dehydrogenase 1 (G3PD1), phosphoglycerate kinase 1, novelprotein (0610037L13Rik), leucine aminopeptidase 3 (LAP), and hypothetical protein isoform 2. Results show that proteomics could be a useful tool to reveal pharmacological treatments with TC, even if the possible uses of differential spots as biomarkers to detect illegal administration of TC require further studies. Different spot patterns as a consequence of TC treatments seem to be another interesting issue for the consequences on tissue metabolism and meat quality.
Fiskerester bliver functional foods

General information
State: Published
Organisations: Division of Food Production Engineering, National Food Institute, National Institute of Aquatic Resources
Authors: Jørgensen, S. B. (ed.) (Intern), Jessen, F. (Intern)
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: FoodDTU Midt i Ugen
Original language: Danish
Source: orbit
Source-ID: 237098
Publication: Research - peer-review › Journal article – Annual report year: 2008

Long term anoxia in rainbow trout investigated by 2-DE and MS/MS

Twenty-four hours of N-2 induced anoxia induced global perturbations on protein expression in rainbow trout hypodermal fibroblasts cell line. Anoxia was obtained by depleting the medium of O-2 by flushing with N-2, and protein changes were studied by 2-DE coupled with MS providing quantitative measurements of a large number of proteins in one single study. The anoxic insult changed the level of 33 protein spots: 22 of these were up-regulated compared to the control situation and 11 were down-regulated. Using MS/MS sequencing 19 of the 33 protein spots that changed were identified, corresponding to a success rate of more than 50%. The identified proteins included two proteins involved in energy metabolism namely phosphoglycerate mutase and isocitrate dehydrogenase. In addition we observed the up-regulation of a cluster of proteins that contribute to cytoskeleton function. These are calpain, EB1, and Rho GDP dissociation inhibitor.
(GDI). The up-regulation of Rho GDI was shown to develop in a time dependent manner with no significant increase for up to 8 h of anoxia. In conclusion, this study provides a thorough investigation of the effect of anoxia in a cell line from rainbow trout.

**General information**

*State:* Published  
*Organisations:* Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources  
*Authors:* Wulff, T. (Intern), Jessen, F. (Intern), Roepstorff, P. (Ekstern), Hoffmann, E. (Ekstern)  
*Pages:* 1009-1018  
*Publication date:* 2008  
*Main Research Area:* Technical/natural sciences

**Publication information**

*Journal:* Proteomics  
*Volume:* 8  
*Issue number:* 5  
*ISSN (Print):* 1615-9853  
*Ratings:*  
  - BFI (2018): BFI-level 1  
  - BFI (2017): BFI-level 1  
  - Web of Science (2017): Indexed yes  
  - BFI (2016): BFI-level 1  
  - Scopus rating (2016): CiteScore 3.85 SJR 1.492 SNIP 0.89  
  - Web of Science (2016): Indexed yes  
  - BFI (2015): BFI-level 1  
  - Scopus rating (2015): SJR 1.464 SNIP 0.978 CiteScore 3.7  
  - BFI (2014): BFI-level 1  
  - Scopus rating (2014): SJR 1.436 SNIP 0.981 CiteScore 3.73  
  - BFI (2013): BFI-level 1  
  - Scopus rating (2013): SJR 1.48 SNIP 0.985 CiteScore 3.88  
  - ISI indexed (2013): ISI indexed yes  
  - Web of Science (2013): Indexed yes  
  - BFI (2012): BFI-level 1  
  - Scopus rating (2012): SJR 1.489 SNIP 1.099 CiteScore 4.1  
  - ISI indexed (2012): ISI indexed yes  
  - Web of Science (2012): Indexed yes  
  - BFI (2011): BFI-level 1  
  - Scopus rating (2011): SJR 1.677 SNIP 1.182 CiteScore 4.49  
  - ISI indexed (2011): ISI indexed yes  
  - Web of Science (2011): Indexed yes  
  - BFI (2010): BFI-level 1  
  - Scopus rating (2010): SJR 1.494 SNIP 1.127  
  - Web of Science (2010): Indexed yes  
  - BFI (2009): BFI-level 2  
  - Scopus rating (2009): SJR 1.496 SNIP 1.122  
  - Web of Science (2009): Indexed yes  
  - BFI (2008): BFI-level 2  
  - Scopus rating (2008): SJR 1.573 SNIP 1.126  
  - Web of Science (2008): Indexed yes  
  - Scopus rating (2007): SJR 1.84 SNIP 1.201  
  - Web of Science (2007): Indexed yes  
  - Scopus rating (2006): SJR 1.968 SNIP 1.287  
  - Web of Science (2006): Indexed yes  
  - Scopus rating (2005): SJR 1.921 SNIP 1.392  
  - Web of Science (2005): Indexed yes  
  - Scopus rating (2004): SJR 1.803 SNIP 1.341  
  - Web of Science (2004): Indexed yes
Multivariate data analysis of two-dimensional gel electrophoresis protein patterns from few samples

One application of 2D gel electrophoresis is to reveal differences in protein pattern between two or more groups of individuals, attributable to their group membership. Multivariate data analytical methods are useful in pinpointing the spots relevant for discrimination by focusing not only on single spot differences, but on the covariance structure between proteins. However, their outcome is dependent on data scaling, and they may fail in producing valid multivariate models due to the much higher number of "irrelevant" spots present in the gels. The case where only few gels are available and where the aim is to find as many as possible of the group-dependent proteins seems particularly difficult to handle. The present paper investigates such a case regarding the effect of scaling and of prefiltering by univariate nonparametric statistics on the selection of spots. Besides, a modified 'autoscaling' of the full data set based on within-group standard deviations is introduced and shown to be advantageous in revealing potential group-dependent proteins additional to those found by prefiltering.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Section for Aquatic Process and Product Technology
Authors: Jensen, K. N. (Intern), Jessen, F. (Intern), Jørgensen, B. (Intern)
Pages: 1288-1296
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Proteome Research
Volume: 7
Issue number: 3
ISSN (Print): 1535-3893
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.34 SJR 1.705 SNIP 1.002
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.934 SNIP 1.092 CiteScore 4.45
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.945 SNIP 1.185 CiteScore 4.64
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.002 SNIP 1.256 CiteScore 5.16
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.027 SNIP 1.328 CiteScore 5.12
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Protein and lipid oxidation in frozen rainbow trout

General information
State: Published
Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Baron, C. (Intern), Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern), Jacobsen, C. (Intern)
Publication date: 2008
Event: Poster session presented at 99th AOCS Annual Meeting & Expo, Seattle, WA, United States.
Main Research Area: Technical/natural sciences

Bibliographical note
Abstract and poster presentation at the 99th Annual AOCS meeting Seattle, USA May 2008
Source: orbit
Source-ID: 238841
Publication: Research › Poster – Annual report year: 2008

Stress induced alteration in the proteome of farmed trout: investigation of the mechanism behind changes in sensory properties

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Authors: Wulff, T. (Ekstern), Godiksen, H. (Intern), Hyldig, G. (Intern), Jessen, F. (Intern)
Publication date: 2008
Event: Poster session presented at 8th Siena Meeting From Genome to Proteome, Siena, Italy.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 229071
Publication: Research › Poster – Annual report year: 2008

Acute effects of trout on cardiovascular risk markers and plasma proteome

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Multivariate analysis of 2-DE protein patterns - Practical approaches

Practical approaches to the use of multivariate data analysis of 2-DE protein patterns are demonstrated by three independent strategies for the image analysis and the multivariate analysis on the same set of 2-DE data. Four wheat varieties were selected on the basis of their baking quality. Two of the varieties were of strong baking quality and hard wheat kernel and two were of weak baking quality and soft kernel. Gliadins at different stages of grain development were analyzed by the application of multivariate data analysis on images of 2-DEs. Patterns related to the wheat varieties, harvest times and quality were detected on images of 2-DE protein patterns for all the three strategies. The use of the multivariate methods was evaluated in the alignment and matching procedures of 2-DE gels. All the three strategies were able to discriminate the samples according to quality, harvest time and variety, although different subsets of protein spots were selected. The explorative approach of using multivariate data analysis and variable selection in the analyses of 2-DEs seems to be promising as a fast, reliable and convenient way of screening and transforming many gel images into spot quantities.
Protein and lipid oxidation during frozen storage of rainbow trout (*Oncorhynchus mykiss*)

**General information**
- **State:** Published
- **Organisations:** Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Department of Systems Biology, Section for Aquatic Protein Biochemistry
- **Authors:** Baron, C. (Intern), Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern), Jacobsen, C. (Intern)
- **Pages:** 8118-8125
- **Publication date:** 2007
- **Main Research Area:** Technical/natural sciences

**Publication information**
- **Journal:** Journal of Agricultural and Food Chemistry
- **Volume:** 55
- **Issue number:** 20
- **ISSN (Print):** 0021-8561
- **Ratings:**
  - BFI (2018): BFI-level 2
  - BFI (2017): BFI-level 2
  - Web of Science (2017): Indexed yes
  - BFI (2016): BFI-level 2
  - Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
  - Web of Science (2016): Indexed yes
  - BFI (2015): BFI-level 2
  - Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23
  - Web of Science (2015): Indexed yes
  - BFI (2014): BFI-level 2
  - Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
  - Web of Science (2014): Indexed yes
  - BFI (2013): BFI-level 2
  - Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
  - ISI indexed (2013): ISI indexed yes
  - Web of Science (2013): Indexed yes
  - BFI (2012): BFI-level 2
  - Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
  - ISI indexed (2012): ISI indexed yes
  - Web of Science (2012): Indexed yes
  - BFI (2011): BFI-level 2
  - Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
  - ISI indexed (2011): ISI indexed yes
  - Web of Science (2011): Indexed yes
  - BFI (2010): BFI-level 2
  - Scopus rating (2010): SJR 1.408 SNIP 1.392
Protein and lipid oxidation in frozen rainbow trout

General information
State: Published
Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Baron, C. (Intern), Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern), Jacobsen, C. (Intern)
Publication date: 2007

Host publication information
Title of host publication: European Congress of Chemical Engineering (ECCE-6), Copenhagen, 16-20 September 2007
Main Research Area: Technical/natural sciences
Conference: European Congress of Chemical Engineering - 6, Copenhagen, Denmark, 16/09/2007 - 16/09/2007

Bibliographical note
Abstract and Poster
Source: orbit
Source-ID: 224858
Publication: Research - peer-review › Journal article – Annual report year: 2007

Quality of frozen fish

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Nielsen, J. (Intern), Jessen, F. (Intern)
Number of pages: 744
Sensory characterization of different families of farmed rainbow trout

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Section for Aquaculture
Authors: Hyldig, G. (Intern), Leth, N. (Ekstern), Jessen, F. (Intern), Lund, I. (Ekstern), Jokumsen, A. (Intern)
Publication date: 2007

Host publication information
Title of host publication: 23rd NJF-congress, Copenhagen, 27th-29 June
Main Research Area: Technical/natural sciences

Bibliographical note
Abstract
Source: orbit
Source-ID: 225851
Publication: Research › Conference abstract in proceedings – Annual report year: 2007

Variable selection in the analysis of proteome data. Removal of irrelevant variables prior to a Jack-knife procedure

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Section for Aquatic Process and Product Technology
Authors: Jensen, K. N. (Intern), Jessen, F. (Intern), Jørgensen, B. (Intern)
Publication date: 2007

Main Research Area: Technical/natural sciences

Bibliographical note
Source: orbit
Source-ID: 225993
Publication: Research › Poster – Annual report year: 2007

Changes in cod muscle proteins during frozen storage revealed by proteome analysis and multivariate data analysis
Multivariate data analysis has been combined with proteomics to enhance the recovery of information from 2-DE of cod muscle proteins during different storage conditions. Proteins were extracted according to 11 different storage conditions and samples were resolved by 2-DE. Data generated by 2-DE was subjected to principal component analysis (PCA) and discriminant partial least squares regression (DPLSR). Applying PCA to 2-DE data revealed the samples to form groups according to frozen storage time, whereas differences due to different storage temperatures or chilled storage in modified atmosphere packing did not lead to distinct changes in protein pattern. Applying DPLSR to the 2-DE data enabled the selection of protein spots critical for differentiation between 3 and 6months frozen storage with 12months frozen storage. Some of these protein spots have been identified by MS/MS, revealing myosin light chain 1, 2 and 3, triose-phosphate isomerase, glyceraldehyde-3-phosphate dehydrogenase, aldolase A and two ?-actin fragments, and a nuclease diphosphate kinase B fragment to change in concentration, during frozen storage. Application of proteomics, multivariate data analysis and MS/MS to analyse protein changes in cod muscle proteins during storage has revealed new knowledge
on the issue and enables a better understanding of biochemical processes occurring.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Kjærgård, I. V. H. (Intern), Nørrelykke, M. (Ekstern), Jessen, F. (Intern)
Pages: 1606-1618
Publication date: 2006
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Proteomics
Volume: 6
Issue number: 5
ISSN (Print): 1615-9853
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.85 SJR 1.492 SNIP 0.89
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.464 SNIP 0.978 CiteScore 3.7
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.436 SNIP 0.981 CiteScore 3.73
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.48 SNIP 0.985 CiteScore 3.88
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.489 SNIP 1.099 CiteScore 4.1
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.677 SNIP 1.182 CiteScore 4.49
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.494 SNIP 1.127
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.496 SNIP 1.122
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.573 SNIP 1.126
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.84 SNIP 1.201
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.968 SNIP 1.287
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.921 SNIP 1.392
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.803 SNIP 1.341
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.952 SNIP 1.193
changes in fish muscle proteins during frozen storage revealed by proteomics combined with multivariate data analysis

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Kjærsgård, I. V. H. (Intern), Nørrelykke, M. (Ekstern), Jessen, F. (Intern)
Publication date: 2006
Event: Poster session presented at Dansk konference om Molekylær Biologi og Bioteknologi, Vejle, Danmark, juni,
Main Research Area: Technical/natural sciences

Identification of carbonylated proteins in frozen rainbow trout (Oncorhynchus mykiss) fillets and development of protein oxidation during frozen storage

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Lipids and Oxidation, Section for Aquatic Protein Biochemistry
Authors: Kjærsgård, I. V. H. (Intern), Nørrelykke, M. R. (Ekstern), Baron, C. (Intern), Jessen, F. (Intern)
Pages: 9437-9446
Publication date: 2006

Hvad sker der, når vi fryser torsken?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Kjærsgård, I. V. H. (Intern), Nørrelykke, M. (Ekstern), Jessen, F. (Intern)
Pages: 42-56
Publication date: 2006
Main Research Area: Technical/natural sciences
Investigation of two different anoxia models by 2-dimensional gel electrophoresis

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Wulff, T. (Intern), Jessen, F. (Intern), Hoffmann, E. (Ekstern)
Pages: A1433-A1433
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: FASEB Journal
Volume: 20
Issue number: 5
ISSN (Print): 0892-6638
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.68 SJR 2.57 SNIP 1.22
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.788 SNIP 1.249 CiteScore 4.68
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.993 SNIP 1.342 CiteScore 4.92
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.116 SNIP 1.4 CiteScore 5.5
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.071 SNIP 1.441 CiteScore 5.6
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.042 SNIP 1.525 CiteScore 5.4
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 3.414 SNIP 1.572
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.841 SNIP 1.319
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 3.03 SNIP 1.199
Scopus rating (2007): SJR 2.927 SNIP 1.222
Kvalitetsforskelle i opdrætsæred - kan de forudsiges?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Authors: Godiksen, H. (Intern), Hyldig, G. (Intern), Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern)
Publication date: 2006
Main Research Area: Technical/natural sciences

Protein and lipid oxidation during frozen storage of rainbow trout

General information
State: Published
Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Baron, C. (Intern), Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern), Jacobsen, C. (Intern)
Publication date: 2006
Main Research Area: Technical/natural sciences

Proteomics combined with multivariate data analysis

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Stress induced changes in sensory properties and proteome of farmed trout

Use of multivariate analysis in the transformation of 2D gel images into relevant spot quantity data

Effect of age and temperature on amino acid composition and the content of different protein types of juvenile cod (Gadus morhua L.) otoliths
Two-dimensional gel electrophoresis detection of protein oxidation in fresh and tainted rainbow trout muscle

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern)
Pages: 7101-7107
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 52
Issue number: 23
ISSN (Print): 0021-8561
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.408 SNIP 1.392
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.317 SNIP 1.303
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.361 SNIP 1.324
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.249 SNIP 1.439
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.358 SNIP 1.418
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.286 SNIP 1.521
Proteome analysis elucidating post mortem changes in cod (Gadus morhua) muscle proteins

**General information**

*State:* Published  
*Organisations:* National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry  
*Authors:* Kjærsgård, I. V. H. (Intern), Jessen, F. (Intern)  
*Pages:* 3985-3991  
*Publication date:* 2003  
*Main Research Area:* Technical/natural sciences

**Publication information**

*Journal:* Journal of Agricultural and Food Chemistry  
*Volume:* 51  
*Issue number:* 14  
*ISSN (Print):* 0021-8561  
*Ratings:*  
BFI (2018): BFI-level 2  
BFI (2017): BFI-level 2  
Web of Science (2017): Indexed yes  
BFI (2016): BFI-level 2  
Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344  
Web of Science (2016): Indexed yes  
BFI (2015): BFI-level 2  
Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23  
Web of Science (2015): Indexed yes  
BFI (2014): BFI-level 2  
Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25  
Web of Science (2014): Indexed yes  
BFI (2013): BFI-level 2  
Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44  
ISI indexed (2013): ISI indexed yes  
Web of Science (2013): Indexed yes  
BFI (2012): BFI-level 2  
Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2  
ISI indexed (2012): ISI indexed yes  
Web of Science (2012): Indexed yes  
BFI (2011): BFI-level 2  
Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1  
ISI indexed (2011): ISI indexed yes
Sarcoplasmic reticulum Ca 2+ -ATPase and cytochrome oxidase as indicators of frozen storage in cod (Gadus morhua)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Authors: Godiksen, H. (Intern), Hyldig, G. (Intern), Jessen, F. (Intern)
Pages: 2579-2585
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Food Science
Volume: 68
Issue number: 8
ISSN (Print): 0022-1147
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.77 SNIP 1.013 CiteScore 1.92
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.83 SNIP 0.985 CiteScore 1.97
Web of Science (2015): Indexed yes
ATP, IMP, and glycogen in cod muscle at onset and during development of rigor mortis depend on the sampling location

Variation in glycogen, ATP, and IMP contents within individual cod muscles were studied in ice stored fish during the progress of rigor mortis. Rigor index was determined before muscle samples for chemical analyzes were taken at 16 different positions on the fish. During development of rigor, the contents of glycogen and ATP decreased differently in relation to rigor index depending on sampling location. Although fish were considered to be in strong rigor according to the rigor index method, parts of the muscle were not in rigor as high ATP concentrations were found in dorsal and tail muscle.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Cappeln, G. (Intern), Jessen, F. (Intern)
Pages: 991-995
Publication date: 2002
Main Research Area: Technical/natural sciences
Extracting information from two-dimensional electrophoresis gels by partial least squares regression

Two-dimensional gel electrophoresis (2-DE) produces large amounts of data and extraction of relevant information from these data demands a cautious and time consuming process of spot pattern matching between gels. The classical approach of data analysis is to detect protein markers that appear or disappear depending on the experimental conditions. Such biomarkers are found by comparing the relative volumes of individual spots in the individual gels. Multivariate statistical analysis and modelling of 2-DE data for comparison and classification is an alternative approach utilising the combination of all proteins/spots in the gels. In the present study it is demonstrated how information can be extracted by multivariate data analysis. The strategy is based on partial least squares regression followed by variable selection to find proteins that individually or in combination with other proteins vary informatively in relation to the experimental conditions. Finding of such coherent protein patterns leads to identification of potential relations between the involved proteins, and will be useful for focusing further investigation of proteins that relate to the chosen experimental conditions.

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Jessen, F. (Intern), Lametsch, R. (Ekstern), Bendixen, E. (Ekstern), Kjærgård, I. V. H. (Intern), Jørgensen, B. (Intern)
Pages: 32-35
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Proteomics
Volume: 2
Issue number: 1
ISSN (Print): 1615-9853
Ratings:
- BFI (2018): BFI-level 1
- BFI (2017): BFI-level 1
- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 1
- Scopus rating (2016): CiteScore 3.85 SJR 1.492 SNIP 0.89
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 1.464 SNIP 0.978 CiteScore 3.7
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 1.436 SNIP 0.981 CiteScore 3.73
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 1.48 SNIP 0.985 CiteScore 3.88
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 1.489 SNIP 1.099 CiteScore 4.1
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 1.677 SNIP 1.182 CiteScore 4.49
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 1.494 SNIP 1.127
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 2
- Scopus rating (2009): SJR 1.496 SNIP 1.122
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 2
Temperature and Ca2+-dependence of the sarcoplasmic reticulum Ca2(+)-ATPase in haddock, salmon, rainbow trout and zebra cichlid

Temperature dependence of Ca2+-ATPase from the sarcoplasmic reticulum (SR) in rabbit muscle has been widely studied, and it is generally accepted that a break point in Arrhenius plot exist at approximately 20 degreesC. Whether the break point arises as a result of temperature dependent changes in the enzyme or its membrane lipid environment is still a matter of discussion. In this study we compared the temperature dependence and Ca2+-dependence of SR Ca2+-ATPase in haddock (Melanogrammus aeglefinus), salmon (Salmo, salar), rainbow trout (Oncorhynchus mykiss) and zebra cichlid (Cichlasoma nigrofasciatum). The Arrhenius plot of zebra cichlid showed a break point at 20 degreesC, and the haddock Arrhenius plot was non-linear with pronounced changes in slope in the temperature area, 6-14 degreesC. In Arrhenius plot from both salmon and rainbow trout a plateau exists with an almost constant SR Ca2+- ATPase activity. The temperature range of the plateau was 14-21 and 18-25 degreesC in salmon and rainbow trout, respectively. Ca2+-dependence in the four different fish species investigated was very similar with half maximal activation (K-0.5) between 0.2 and 0.6 muM and half maximal inhibition (I-0.5) between 60 and 250 muM. Results indicated that interaction between SR Ca2+-ATPase and its lipid environment may play an important role for the different Arrhenius plot of the different types of fish species investigated. (C) 2002 Elsevier Science Inc. All rights reserved.
ATP and glycogen content related to gaping in pre rigor cod (Gadus morhua) frozen in blocks at sea

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Cappeln, G. (Intern), Jessen, F. (Intern)
Pages: 49-62
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Aquatic Food Product Technology
Volume: 10
ISSN (Print): 1049-8850
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.59 SJR 0.268 SNIP 0.582
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.298 SNIP 0.623 CiteScore 0.65
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.275 SNIP 0.632 CiteScore 0.62
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.281 SNIP 0.558 CiteScore 0.59
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.429 SNIP 0.545 CiteScore 0.64
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.385 SNIP 0.621 CiteScore 0.68
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.282 SNIP 0.34
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.197 SNIP 0
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.2
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.28
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.216
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.205
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.236 SNIP 0.636
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.21 SNIP 0.564
Chilling and freezing of fish and fishery products

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Nielsen, J. (Intern), Larsen, E. (Intern), Jessen, F. (Intern)
Pages: 403-437
Publication date: 2001

Host publication information
Title of host publication: Advances in food refrigeration
Place of publication: Leatherhead
Publisher: Leatherhead Publishing
Editor: Sun, D.
ISBN (Print): 09-05-74883-2
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 226859
Publication: Research - peer-review » Book chapter – Annual report year: 2001

Cytochrome oxidase as an indicator of ice storage and frozen storage
The potential of cytochrome oxidase as an indicator of ice storage and frozen storage of fish was investigated. Optimal assay conditions for cytochrome oxidase in a crude homogenate from cod muscle were studied. Maximal cytochrome oxidase activity was found at pH 6.5-7.5 and an assay temperature of 30 degreesC. Maximal activation by Triton X-100 was obtained in a range of 0.62-1.25 mM Triton X-100. The specificity of the assay was high, as cytochrome oxidase was inhibited 98% by 33 μM of the specific inhibitor sodium azide. The coefficient of variation of cytochrome oxidase activity in different cods was 21%, and the coefficient of variation of different analyses on the same homogenate was 5%. It was shown that ice storage of muscle samples before they were frozen and thawed resulted in a major freezing-induced activation of cytochrome oxidase activity. The enzyme may therefore be used as an indicator of frozen fish to determine if the fish has been stored on ice before freezing. Cytochrome oxidase activity showed also potential as an indicator of frozen storage, as it was possible to distinguish between the frozen storage temperatures -9, -20, and -40 degreesC.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Godiksen, H. (Intern), Jessen, F. (Intern)
Pages: 4488-4493
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 49
Issue number: 9
ISSN (Print): 0021-8561
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
Degradation of ATP and glycogen in cod (Gadus morhua) muscle during freezing

Changes in ATP, IMP, lactate and glycogen contents in the muscle of cod were followed during freezing at temperatures of -20°C and -45°C. ATP degradation was accompanied by a corresponding increase in IMP content. Simultaneous measurement of temperature showed that at both freezing rates, the greatest decrease in ATP content was observed when the temperature reached -0.8°C. Glycolysis occurred during freezing of cod as indicated by an increase in lactate content. The changes found in all measured metabolites were more pronounced when freezing was performed at a slow rate compared to a fast rate due to the thermal arrest time at about 0.8°C.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Cappeln, G. (Intern), Jessen, F. (Intern)
Pages: 555-567
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Food Biochemistry
Volume: 25
Issue number: 6
ISSN (Print): 0145-8884
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.394 SNIP 0.602 CiteScore 1.09
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.421 SNIP 0.585 CiteScore 1.13
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.409 SNIP 0.555 CiteScore 0.9
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.426 SNIP 0.613 CiteScore 1.03
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.449 SNIP 0.7 CiteScore 0.89
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.442 SNIP 0.492 CiteScore 0.92
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.474 SNIP 0.754
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.618 SNIP 0.769
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.542 SNIP 0.633
Scopus rating (2007): SJR 0.45 SNIP 0.98
Scopus rating (2006): SJR 0.349 SNIP 0.694
Scopus rating (2005): SJR 0.377 SNIP 0.828
Scopus rating (2004): SJR 0.445 SNIP 0.674
Scopus rating (2003): SJR 0.318 SNIP 0.488
Scopus rating (2002): SJR 0.484 SNIP 0.541
Scopus rating (2001): SJR 0.692 SNIP 0.99
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.325 SNIP 0.609
Glycolysis and ATP degradation in cod (Gadus morhua) at subzero temperatures in relation to thaw rigor

Glycolysis was shown to occur during freezing of cod of decrease in glycogen and an increase in lactate. In addition, the ATP content decreased during freezing. Synthesis of ATP was measured as degradation of glycogen. During storage at -9 and -12 degreesC it was found that degradation of ATP was faster than synthesis of ATP. This was leading to presence of glycogen even at low ATP concentrations. The ATP and glycolycin degradation rates and lactate formation rate reached an optimum (both in small samples as well as in whole fish) when stored at -9 degreesC compared to -12 degreesC. Evidence of ATP synthesis at 0 degreesC during thawing was obtained in samples as well as in whole fish. Reduction or elimination of thaw rigor effects (shrinkage and drip loss) during a period of frozen storage were examined. When thawing at 5 degreesC, fillets stored at -9 degreesC showed significantly less shrinkage than fillets stored at -40 degreesC. In addition, pre-rigor fillets (-40 degreesC) showed significantly the smallest drip loss compared with fillets stored at -9 degreesC. (C) 2001 Academic Press.
Sarcoplasmic reticulum CA 2+ ATPase activity in cod (Gadus morhua) muscle measured in crude homogenates
Sarcoplasmic Reticulum Ca2+-ATPase Activity in Cod (Gadus morhua) Muscle Measured in Crude Homogenates

General information
State: Published
Organisations: National Institute of Aquatic Resources
Authors: Godiksen, H. (Intern), Jessen, F. (Intern)
Pages: 343-359
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Food Biochemistry
Volume: 25
Issue number: 4
ISSN (Print): 0145-8884
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.394 SNIP 0.602 CiteScore 1.09
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.421 SNIP 0.585 CiteScore 1.13
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.409 SNIP 0.555 CiteScore 0.9
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.426 SNIP 0.613 CiteScore 1.03
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.449 SNIP 0.7 CiteScore 0.89
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.442 SNIP 0.492 CiteScore 0.92
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.474 SNIP 0.754
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.618 SNIP 0.769
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.542 SNIP 0.633
Scopus rating (2007): SJR 0.45 SNIP 0.98
The effect of ice storage and freeze/thaw cycles on CA 2+ -ATPase and Cytochrome oxidase activity in salmon (Salmo salar)

Identification of fish species after cooking by SDS-PAGE and Urea IEF: a collaborative study
Sarcoplasmic reticulum CA 2+ -ATPASE activity changes during frozen storage depend on pre-freezing time

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Jessen, F. (Intern), Jensen, U. (Ekstern), Godiksen, H. (Intern), Georgakis, S. (ed.) (Ekstern)
Pages: 412
Publication date: 2000
Conference: 29th West European Fish Technologists Association Meeting, Leptocarya, Greece, 10/10/1999 - 10/10/1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Proceedings of 29th WEFTA Meeting, 10 - 14 october, 1999 - Leptocarya - Pieria, Greece
Original language: English
Source: orbit
Source-ID: 226043
Publication: Research › Conference article – Annual report year: 2000

Species identification of smoked and gravad fish products by sodium dodecylsulphate polyacrylamide gel electrophoresis, urea isoelectric focusing and native isoelectric focusing: a collaborative study
A collaborative study on the use of sodium dodecylsulphate polyacrylamide gel electrophoresis (SDS-PAGE), urea-isoelectric focusing (urea-IEF) and native isoelectric focusing for the identification of species of smoked salmonids, gravad salmonids and smoked eels was carried out by eight laboratories. With SDS-PAGE, minor changes took place in the profiles of the processed salmonid species making it impossible or very difficult to identify closely related species. With urea-IEF, there were fewer changes in the profiles due to processing and the system generally had greater species-discriminating power for the processed salmonids than SDS-PAGE. The profiles of the eel species as obtained on SDS-PAGE or urea-IEF were not affected by smoking. Urea-IEF had greater species-discriminating power than SDS-PAGE for the eel species. Native IEF was useful in providing supplementary identification on species difficult to identify by SDS-PAGE or by urea-IEF in the case of cold smoked products. (C) 2000 Elsevier Science Ltd. All rights reserved.

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Pages: 1-7
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Chemistry
Volume: 71
Issue number: 1
ISSN (Print): 0308-8146
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
Web of Science (2016): Indexed yes
A standarized method of identification of raw and heat-processed fish by urea isoelectric focusing: A collaboratory study

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Etienne, M. (Ekstern), Jerome, M. (Ekstern), Fleurence, J. (Ekstern), Rehein, H. (Ekstern), Kundiger, R. (Ekstern), Yman, I. (Ekstern), Ferm, M. (Ekstern), Craigh, A. (Ekstern), Mackie, I. (Ekstern), Jessen, F. (Intern), Smelt, A. (Ekstern), Luten, J. (Ekstern)
Development of a sodium dodecyl sulfate-polyacrylamide gel electrophoresis reference method for the analysis and identification of fish species in raw and heat-processed samples: A collaborative study

A collaborative study was carried out in seven European labs with the aim of achieving a sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) standard operation procedure to identify fish species in raw and cooked samples. Urea and SDS-containing solutions were evaluated as extractants. Several preelectrophoretic operations - such as treatment with RNase/DNase, ultrafiltration and desalting - and up to ten types of gels and three SDS-PAGE systems were considered. The SDS-containing solution allowed a higher protein extractability than urea. Unlike urea extraction, SDS extraction seemed not to be influenced so much by the state of the sample (raw, cooked at 60 degrees C, cooked at 85 degrees C). Desalting, ultrafiltration or treatment with RNase/DNase did not improve the discriminatory power of the protein patterns. Commercial homogeneous 15% ExcelGels, especially when they were silver stained, yielded good results and afforded higher reproducibility, thus allowing a better matching of results among the laboratories participating in this collaborative study. Under the optimized technical conditions described above, all the fish species tested, either raw and cooked, yielded reproducible and discriminant species-specific protein patterns.
Species identification of cooked fish by urea isoelectric focusing and sodium dodecylsulfate polyacrylamide gel electrophoresis: a collaborative study

The suitability and reliability of urea IEF and SDS-PAGE for the identification of cooked fish flesh was tested by a collaborative study among nine laboratories. Urea IEF was performed with CleanGels as well as with ImmobilineGels, and ExcelGels were used for SDS-PAGE, enabling all three types of gels to be run in the same flat bed electrophoresis chamber. By strictly following optimised standard operation procedures (SOPs), five unknown cooked samples had to be identified with each technique using a set of 10 raw reference samples. With urea IEF, only one out of 35 identifications was incorrect, and with SDS-PAGE a similar result was obtained. It was concluded that methods, as now developed, are suitable for checking the species declaration of fishery products. (C) 1999 Elsevier Science Ltd. All rights reserved

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Pages: 333-339
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Chemistry
Volume: 67
Issue number: 4
ISSN (Print): 0308-8146
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
Web of Science (2016): Indexed yes
Synthesis and degradation of adenosine triphosphate in cod (Gadus morhua) at subzero temperatures

This study has demonstrated that the extraction step is very important when analysing ATP and its degradation products. An important factor is whether the sample is fresh, frozen or thawed when homogenised since thawing of the sample will lead to rapid loss of ATP. During frozen storage it was found that ATP in cod (Gadus morhua) was stable at -40 degrees C in small samples for at least 12 weeks. At -20 degrees C it was found that ATP content increases initially and thereafter falls. It was demonstrated that degradation of ATP in small samples occurs faster at 0 degrees C than at -2 and -5 degrees C. Furthermore, it was found that in whole cod ATP could be synthesised at a significant rate at -7 degrees C. (C) 1999 Society of Chemical Industry.
Factors affecting the quality of frozen meat and fish

**General information**
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Archer, G. (Ekstern), Evans, J. (Ekstern), Jessen, F. (Intern), Nielsen, J. (Intern), James, S. (Ekstern)
Pages: 17-25
Publication date: 1998

**Host publication information**
Place of publication: Leeds
Publisher: University of Leeds
Editors: Kennedy, C., Archer, G.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 224822
Publication: Research - peer-review › Book chapter – Annual report year: 1998

Freeze denaturation of fish proteins investigated by DSC

**General information**
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Jessen, F. (Intern), Geirsdottir, M. (Ekstern)
Publication date: 1998

**Host publication information**
Title of host publication: Contribution at the concerted action: The preservation of frozen food quality and safety throughout the distribution chain
Main Research Area: Technical/natural sciences

**Bibliographical note**
Portomeeting, 10-13 September 1998
Source: orbit
Source-ID: 226040
Publication: Research › Book chapter – Annual report year: 1998

Relation between TMAOase activity and content of formaldehyde in fillet minces and belly flap mince from gadoid fishes

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Pages: 114-118
Publication date: 1997
Relation between TMAOase activity and content of formaldehyde in fillet minces and bellyflap minces from gadoid fishes

General information
State: Published
Organisations: National Institute of Aquatic Resources
Pages: 114-118
Publication date: 1997
Main Research Area: Technical/natural sciences

Fish quality - role of biological membranes

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Jessen, F. (Intern)
Publication date: 1995

Influence of variation in methodology on reliability of the isoelectric focusing method of fish species identification

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Rehbein, H. (Ekstern), Etienne, M. (Ekstern), Jerome, M. (Ekstern), Hattula, T. (Ekstern), Knudsen, L. (Ekstern), Jessen, F. (Intern), Luten, J. (Ekstern), Bouquet, W. (Ekstern), Mackie, I. (Ekstern), Ritchie, A. (Ekstern), Martin, R. (Ekstern), Mendes, R. (Ekstern)
Pages: 193-197
Publication date: 1995
Main Research Area: Technical/natural sciences
Partial purification and characterization of a cellular acidic phospholipase A2 from cod (Gadus morhua) muscle

General information
State: Published
Organisations: Section for Aquatic Protein Biochemistry, National Institute of Aquatic Resources
Authors: Aaen, B. (Ekstern), Jessen, F. (Intern), Jensen, B. (Ekstern)
Pages: 547-554
Publication date: 1995
Main Research Area: Technical/natural sciences

Publication information
Journal: Comparative Biochemistry and Physiology. Part B: Biochemistry & Molecular Biology
Volume: 110
ISSN (Print): 1096-4959
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.607 SNIP 0.787 CiteScore 1.7
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.736 SNIP 0.775 CiteScore 1.69
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.734 SNIP 0.745 CiteScore 1.87
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.717 SNIP 0.979 CiteScore 2.11
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.678 SNIP 0.948 CiteScore 2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.74 SNIP 0.91 CiteScore 2.14
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.631 SNIP 0.896
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.591 SNIP 0.775
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.577 SNIP 0.809
Scopus rating (2007): SJR 0.674 SNIP 0.845
Scopus rating (2006): SJR 0.632 SNIP 0.818
Scopus rating (2005): SJR 0.674 SNIP 0.824
Scopus rating (2004): SJR 0.71 SNIP 0.867
Scopus rating (2003): SJR 0.605 SNIP 0.827
Scopus rating (2002): SJR 0.458 SNIP 0.675
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.433 SNIP 0.639
Web of Science (2001): Indexed yes
Projects:

Developing a decision support tool for process optimization for fish product

National Food Institute
Period: 01/01/2017 → 31/12/2019
Number of participants: 4
PhD Student:
Jordbrekk Blikra, Marthe (Intern)
Supervisor:
Feyissa, Aberham Hailu (Intern)
Skipnes, Dagbjørn (Ekstern)
Main Supervisor:
Jessen, Flemming (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat ekstern
Project: PhD

Nuutaq: New concept for production of cod in Greenland - Best-practice with focus on quality and sustainability

National Food Institute
Period: 01/01/2017 → 31/12/2019
Number of participants: 4
PhD Student:
Sørensen, Jonas Steenholdt (Intern)
Supervisor:
Bøknæs, Niels (Intern)
Jessen, Flemming (Intern)
Main Supervisor:
Dalgaard, Paw (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Industrial PhD
Project: PhD

Improving bio-utilisation of marine algae as sustainable feed ingredients to increase efficiency and quality of aquaculture production

Global population growth and increase in living standards will push up the demand for fish-derived protein in the future. However, resource scarcity (feed, water, and energy), environmental impacts, and changes in climate and growing conditions can seriously hamper aquaculture that supplies a significant proportion of human food. New sustainable protein and lipid sources and improved technologies to increase bio-availability of existing sources will be needed to ensure adequate supply of aquafeeds to ensure growth of aquaculture. On the other hand, the growth of the industry has caused environmental concerns. Interestingly, aquaculture effluents can be an excellent medium for algal growth, although they are not usually reused since they contain residual organic compounds, minerals and other micro-pollutants.

MARINALGAE4aqua is an innovative research project that targets the development of strategies to increase efficiency of important European farmed fish species (Atlantic salmon and European sea bass) and reduce the environmental impact using micro- & macro-algal biomass as feed ingredients by: I. Culturing marine algae under optimized technological processes to remove organic compounds and minerals from fish farm effluents, and producing high value products for aquafeeds while recycling nutrients; thus improving the water body quality and reducing the environmental impact. II. Identifying novel feed additives to improve fish digestive capacity and nutrient metabolism upon using the selected algae. III. Improving fish growth and end product quality, reducing time to slaughter and providing a safe and healthy food item with wide consumer acceptance. MARINALGAE4aqua aims to tackle the sustainability challenges of the aquafeed.
industry by developing cost-effective and resource-efficient alternatives to FM and FO by providing: a) efficient new processes to valorise selected marine algae that could reduce EU imports of protein and lipid sources and minimize over-exploitation of wild fish stocks, loss of biodiversity and environmental burden and b) high sensory quality, acceptable fish products that meet food safety standards and dietary needs for a healthy life. MARINALGAE4aqua will exploit cost-efficient and environmentally sustainable production and processing technologies to produce algal biomass suitable for inclusion in aquafeeds. MARINALGAE4aqua is innovative and cutting edge - it adopts a multidisciplinary approach, integrating molecular (genomics, proteomics) and traditional tools to address physiological, nutritional and environmental challenges in modern aquaculture – providing state-of-the-art knowledge to identify strategies to increase efficiency of farming important European fish species.

National Food Institute
Research Group for Food Production Engineering
Period: 01/06/2016 → 31/05/2019
Number of participants: 1
Acronym: MARINALGAE4Aqua
Project participant:
Jessen, Flemming (Intern)

**Sustainable technologies for optimization of resources and quality in shrimp production**
Peeling of shrimp is a challenge to the industry and the mechanisms involved in shell loosening are unknown. Today a storage period of several days is required before the shrimp can be peeled with a satisfactory yield and with only few shell remains. Using non-thermal technologies as high pressure, microwaves, ultrasound, and treatment with enzymes the aim of the project is to optimize the shell loosening process facilitating peeling as fast as possible after catch.

National Food Institute
Research Group for Food Production Engineering
Research Group for Analytical and Predictive Microbiology
Period: 01/01/2015 → 30/06/2018
Number of participants: 4
Acronym: TECHSHELL
Project participant:
Jessen, Flemming (Intern)
Gringer, Nina (Intern)
Dalgaard, Paw (Intern)
Koukou, Ioulia (Intern)

**Identification and quantification of antimicrobial and antioxidant peptides formed during processing of nitrite cured cooked pork products (IQ-Pork)**
National Food Institute
Period: 15/11/2014 → 15/05/2018
Number of participants: 5
PhD Student:
Pedersen, Sabrine Tauber (Intern)
Supervisor:
Baron, Caroline P. (Intern)
Duedahl-Olesen, Lene (Intern)
Koch, Anette Granly (Ekstern)
Main Supervisor:
Jessen, Flemming (Intern)

**Financing sources**
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

**High value protein products in seaweed**
The overall aim of the project is to develop new technologies that will ensure full utilization of the seaweed raw materials used for carrageenan production. More specifically, the aim is to develop new technologies to extract proteins from the
seaweed either before or after extraction of carrageenan. Different mechanical and enzymatic technologies will be evaluated. The protein composition and the quality of the carrageenan fraction after extraction of proteins will be determined. The process will be scaled up to pilot scale if promising results are obtained in lab scale.

National Food Institute
Research Group for Bioactives – Analysis and Application

Research Group for Food Production Engineering

Period: 20/10/2014 → 31/01/2016
Number of participants: 5
Acronym: HIT
Project participant:
Jacobsen, Charlotte (Intern)
Holdt, Susan Løvstad (Intern)
Naseri, Alireza (Intern)
Kryger, Karsten (Intern)
Jessen, Flemming (Intern)

Financing sources
Source: Private funding (private)
Name of research programme: KP Pedersen og Hustru Fond
Amount: 800,000.00 Danish Kroner

Rapid methods for determination of enzyme activity and degree of ripeness - herring (pelagic)
In this Norwegian project on alternative production of matjes (herring) the National Food Institute participates on a part concerning protein changes occurring in the herring muscle during the ripening process. By 2D-gel based proteome analysis we will identify these changing proteins in order to define candidate protein markers for establishment of a process control system and also to create knowledge of the ripening process at the molecular level.

National Food Institute
Division of Industrial Food Research
Period: 01/10/2014 → 31/05/2015
Number of participants: 4
Project participant:
Christensen, Line Bach (Ekstern)
Skåra, Ragnhild (Ekstern)
Jessen, Flemming (Intern)
Project Manager, academic:
Skåra, Torstein (Ekstern)

Financing sources
Source: Public research council
Name of research programme: Fiskeri- og havbruksnæringens forskningsfond (FHE), Norge
Web address: http://www.fhf.no/about-fhf/
Amount: 356,059.00 Danish Kroner
Documents:
Rapport 37-2015 - Proteomanalyse_to-dimensjoanl gelelektroforese av Nordsjesild i forhold til modningstid (2)

New analytical process programs- and technologies for optimasation of acid marinated herring production

National Food Institute
Period: 01/05/2014 → 17/05/2018
Number of participants: 5
Phd Student:
Laub-Ekgreen, Maria Helbo (Intern)
Supervisor:
Frosch, Stina (Intern)
Jørgensen, Bo Munk (Intern)
Martinez Lopez, Brais (Intern)
Main Supervisor:
Jessen, Flemming (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

Udvikling af bæredygtige innovative fødevaringredienser på basis af ørredrestprodukter
National Food Institute
Research Group for Bioactives – Analysis and Application
Research Group for Food Production Engineering

Research Group for Nano-Bio Science
Period: 01/01/2014 → 31/12/2015
Number of participants: 12
Acronym: DANFOMEGA
Project participant:
Barlach, Anders (Ekstern)
Honold, Philipp (Intern)
Sørensen, Ann-Dorit Moltke (Intern)
Nouard, Marie-Louise (Intern)
Jessen, Flemming (Intern)
Sloth, Jens Jørgen (Intern)
Rasmussen, Rie Romme (Intern)
Berner, Lis (Intern)
Vu, Thi Thu Trang (Intern)
D. Hansen, Erik (Ekstern)
Ørum, Poul (Ekstern)

Project Manager, academic:
Jacobsen, Charlotte (Intern)

Financing sources
Source: Public research programme (public)
Name of research programme: Grønt Udviklings- og DemonstrationsProgram (GUDP)
Amount: 10,940,907.00 Danish Kroner
Project

Muscle-specific stability of pork packaged in modified atmosphere during refrigerated storage
National Food Institute
Period: 01/11/2012 → 21/04/2016
Number of participants: 8
Phd Student:
Spanos, Dimitrios (Intern)
Supervisor:
Baron, Caroline P. (Intern)
Christensen, Mette (Ekstern)
Tørngren, Mari Ann (Ekstern)
Main Supervisor:
Jacobsen, Charlotte (Intern)
Examiner:
Jessen, Flemming (Intern)
Ertbjerg, Per (Ekstern)
Lund, Marianne Nissen (Ekstern)

Financing sources
Source: Internal funding (public)
Functional nano-microstructures for food and bioengineering applications

National Food Institute
Period: 01/03/2012 → 02/07/2015
Number of participants: 3
Phd Student:
Jørgensen, Lars (Intern)
Supervisor:
Jessen, Flemming (Intern)
Main Supervisor:
Chronakis, Ioannis S. (Intern)

Financing sources
Source: Internal funding (public)

Development and characterization of nano-microstructures as carrier for bioactive compounds

National Food Institute
Period: 01/10/2011 → 02/09/2015
Number of participants: 6
Phd Student:
Boutrup Stephansen, Karen (Intern)
Examiner:
Sloth, Jens Jørgen (Intern)
Sarmento, Bruno (Ekstern)

Financing sources
Source: Internal funding (public)

Functional Electrospun Nanostructures and Microstructures for Food and Bioengineering Applications

The objectives of this project is to generate the scientific and technological basis to: (i) develop new nano-microcarrier systems for bioactive compounds using electrospun nano-microstructures for their immobilization, (ii) develop new nano-microdelivery systems utilizing enzyme functionality and molecular imprinted polymers for controlled delivery/release of bioactives, (iii) study the structural and functional properties of nano-microstructures (NMS) as novel components of food and bioengineered products, (iv) evaluate their bioavailability and degradation/digestion in-vitro and in-vivo.

The overall aim is to create new functional systems that have a potential usage in foods/healthy foods, as nutritional supplements, as pharmaceutical products and for a range of other bioengineering applications. The project’s ambition is also to contribute to research training in research institutes and industrial companies as well as education of industrial employees. We expect that the obtained knowledge will strengthen the Danish industry’s potential to emerging nano-microtechnologies and technologies of bioactives.
Discovering the redox-, glyco- and phosphoproteomes in lactobacillus acidophilus NCFM and related bacteria

Department of Systems Biology
Period: 01/09/2009 → 03/02/2014
Number of participants: 6
PhD Student:
Dedvisitsakul, Plaipol (Intern)
Supervisor:
Jacobsen, Susanne (Intern)
Main Supervisor:
Svensson, Birte (Intern)
Examiner:
Jessen, Flemming (Intern)
Larsen, Martin R. (Ekstern)
Liu, Fulai (Ekstern)
Aquatic Resources as a Source of Potential Natural Antioxidants for Food Industry

It is well documented that long-chain polyunsaturated omega-3 fatty acids (omega-3 PUFA) have a range of beneficial health effects such as reducing atherosclerosis, prevention and treatment of numerous disorders like cardiovascular disease, cancer, diabetics, mental illness etc.

At the same time they are very susceptible to lipid oxidation that not only causes deterioration of food sensory quality, but also contributes to carcinogenesis, atherosclerosis and aging processes in humans. Hence, the oxidative instability of omega-3 fatty acids often limits their use as nutritionally beneficial lipids in fish oil enriched foods. Addition of antioxidants that scavenge free radicals and control pro-oxidative metals is used to retard lipid oxidation.

Many of the most commonly used antioxidants are synthetic compounds, which have been reported to possess carcinogenic effect in humans and there is, therefore a need to find potent and safer natural antioxidants.

Many living organisms in the marine environment are rich in omega-3 PUFA. Our hypothesis is therefore that these marine organisms are rich in natural antioxidants that are able to protect them against lipid oxidation and that these antioxidants can be used to protect foods against oxidation.

Objectives

The overall goal of the project is to identify natural compounds with antioxidant activity from aquatic resources such as marine algae, bacteria, fungi, peptides isolated from fish waste and to evaluate potential applications of these novel compounds to enhance oxidative stability, flavor quality and nutritional value of foods enriched with omega-3 fatty acids and seafood based products.

This will be achieved by:

- Screening extracts from aquatic resources like marine algae, bacteria, fungi and peptides isolated from fish waste for their antioxidative mechanisms and properties and identifying the most promising sources of antioxidants.
- Evaluating the antioxidant properties of the most promising antioxidant sources in different foods systems enriched with omega-3 fatty acids such as milk, dressing and seafood.

Project financing:

Danish research council for Technology and production (FTP)
National Food Institute
Division of Industrial Food Research
Department of Systems Biology
Bacterial Ecophysiology and Biotechnology
Metabolomics Platform
Period: 01/01/2009 → 31/12/2012
Number of participants: 6
Acronym: Potential natural antioxidants
Contact person:
Jacobsen, Charlotte (Intern)
Project participant:
Gram, Lone (Intern)
Jessen, Flemming (Intern)
Nielsen, Henrik Hauch (Intern)
Nielsen, Kristian Fog (Intern)
Project Manager, organisational:
Farvin Habebullah, Sabeena (Intern)

positive effects on the enzyme regulating blood tension (ACE) and with antioxidative effects, but also several that inhibit or kill pancreatic cancer cells in culture and some that strongly inhibit the adhesion of ulcer forming bacteria (Helicobacter pylori) to stomach cells in culture. Especially the effects on cancer cells and bacteria have interesting perspectives if the peptides show up to function in whole organisms, including human, because they would then have potential as future anticancer and antibacterial drugs.

National Food Institute

Division of Industrial Food Research

Division of Toxicology and Risk Assessment

Period: 01/04/2008 → 31/12/2012

Number of participants: 10

Acronym: PEPFISH

Project participant:

Nielsen, Henrik Hauch (Intern)

Andersen, Lisa Lystbæk (Intern)

Nielsen, Michael Engelbrecht (Intern)

Hoffmann, Else K. (Ekstern)

Andersen, Leif Percival (Ekstern)

Elvevol, Edel Oddny (Ekstern)

Jakobsen, Greta (Ekstern)

Rørvig, Peter (Ekstern)

Project Manager, academic:

Jessen, Flemming (Intern)

Working partner:

Lynglev, Gitte Budolfesen (Ekstern)

Financing sources

Source: Public research council

Name of research programme: Programkomiteen for Sundhed, Fødevarer og Velfærd

Amount: 8,000,000.00 Danish Kroner

Project: PhD

Allergenicity of Peptides from Food Allergens - a Food Allergy Sensitisation Study

National Food Institute

Period: 01/01/2007 → 27/06/2012

Number of participants: 6

Phd Student:

Bøgh, Katrine Lindholm (Intern)

Supervisor:

Nielsen, Henrik Hauch (Intern)

Main Supervisor:

Nielsen, Michael Engelbrecht (Intern)

Examiner: Jessen, Flemming (Intern)

Andersen, Leif Percival (Ekstern)

Wiegertjes, Geert Frits (Ekstern)

Financing sources

Source: Internal funding (public)

Name of research programme: Offentlig finansiering

Project: PhD
Healthy, Nutritious and Tasty Fish for the Future

National Food Institute
Period: 01/01/2007 → 21/12/2011
Number of participants: 6
PhD Student:
Rentsch, Maria Louise (Intern)
Supervisor:
Lauritzen, Lotte (Ekstern)
Main Supervisor:
Jessen, Flemming (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Højrup, Peter (Ekstern)
Yaqoob, Parveen (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Project: PhD

Superfrysning af fisk - optimering af kvalitet og økonomi

National Food Institute
Period: 01/03/2006 → 21/04/2010
Number of participants: 5
PhD Student:
Burgaard, Maria Garver (Intern)
Main Supervisor:
Jørgensen, Bo Munk (Intern)
Examiner:
Jessen, Flemming (Intern)
Arason, Sigurjón (Ekstern)
Karlsson, Anders Hans (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Ansat eksternt
Project: PhD

Ultra Lav Temperatur Forsyningskæde for akvakultur produkter baseret på Ørred og Ørredkaviar

National Food Institute
Division of Industrial Food Research
Period: 05/01/2006 → 31/12/2007
Number of participants: 2
Organic Aquaculture - the linkage between sustainable production and superior products

This project will contribute to the successful establishment of organic trout farming in Denmark. It will develop and optimise new recipes for organic fish feeds with high levels of organic vegetable protein of Danish origin. These will be fed to trout to investigate feed quality as digestibility, effects on the environment, feed conversion, and growth. Effects of the feeds upon general health and welfare, and immunocompetence (vaccination efficacy), will be assessed. Objective sensory and biochemical analyses will provide an overall picture of the eating quality of trout raised with the new organic feeds at an organic farm. Consumer preference for trout with pale coloured meat will be explored, plus other market issues for organic trout (supply chain, traceability, export). Results will be disseminated to industry, consumers and regulatory authorities with open workshops. Guidelines will be prepared for optimal rearing and marketing of organic trout.

National Veterinary Institute
National Food Institute
Division of Seafood Research
Division of Industrial Food Research
Danish Institute for Fisheries and Marine Research
Royal Veterinary and Agricultural University
Danish Technological Institute

Dansk Akvakultur
Period: 01/01/2006 → 31/12/2010
Number of participants: 11
Acronym: ORAQUA
Project ID: 22451
Project participant:
Jokumsen, Alfred (Ekstern)
Pedersen, Lars-Flemming (Ekstern)
Dalsgaard, Inger (Intern)
Nielsen, Henrik Hauch (Intern)
Jacobsen, Charlotte Munch (Ekstern)
Jessen, Flemming (Intern)
Larsen, Erling P. (Ekstern)
Nielsen, Michael Engelbrecht (Ekstern)
Kold, John (Ekstern)
Larsen, Villy J. (Ekstern)

Project Manager, organisational:
McKenzie, David J. (Ekstern)

Financing sources
Source: Forskningsprojekter - Fødevareministeriet
Name of research programme: Forskningsprojekter - Fødevareministeriet
Amount: 548,554.00 Danish Kroner

Prediction of technological and sensory quality of trout

Manufacturing food of high and uniform quality requires good knowledge of the characteristics of the raw material, and knowledge of how these characteristics vary between different raw materials. It is also necessary to know how suitable a given raw material is for different types of product, and how the interaction between raw materials and production technology affects the sensory quality of the final product.

The most important differences between fish raw materials will be reflected in the pheno type of the fish, irrespective of whether the cause of this is genetic or environmental. Characterization of pheno type will thus be appropriate to identifying the characteristics of the raw material (protein markers) that will be included in a model to predict the technological and sensory quality of the final product.
The project will produce a number of frozen and smoked products from different raw materials. Characterisation of phenotypes will take place through proteom analyses, where image analysis of 2DE gels will reveal protein markers that can potentially relate the quality of the final product to the characteristics of the original raw material. These proteins will be identified using mass spectroscopy and antibodies against them will be raised. The antibodies will be used to develop rapid immune chemical methods. The quality of both the different varieties of raw materials and the

National Food Institute
Division of Industrial Food Research
Department of Systems Biology
Enzyme and Protein Chemistry
Period: 01/08/2003 → 30/04/2009
Number of participants: 6
Project participant:
Kjærsgård, Inger Vibeke Holst (Intern)
Godiksen, Helene (Intern)
Hyldig, Grethe (Intern)
Barkholt, Vibeke (Intern)
Frøkiær, Hanne (Intern)
Project Manager, academic:
Jessen, Flemming (Intern)

Væksthastighed og kvalitet af opdrætsfisk - Effekt af avlsarbejde på regnbueørred
Department of Systems Biology
Period: 01/02/2002 → 23/10/2006
Number of participants: 4
Phd Student:
Leth, Niels Krarup (Ekstern)
Main Supervisor:
Jessen, Flemming (Intern)
Examiner:
Jacobsen, Susanne (Intern)
Frier, Jens-Ole (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Kandidatstipendium ansat ekste
Project: PhD

Proteome analysis of muscle tissues: Two dimensional protein mapping of pig and cod muscle.
Certain aspects of muscle biology such as metabolism, growth and development of muscle cells influence the quality of muscle based foods. In addition, the proteolytic processes that start immediately after slaughter or catch (post mortem metabolism) have major impact on taste and texture of meat from fish and mammals. In order to secure optimal quality, it is important to understand the basic mechanisms of muscle biology as well as to understand the post mortem processes that turn muscle into meat. Hence it is important to characterize the involved proteins and genes, and how they interact with each other and with environmental factors to influence meat quality. Proteome analysis is a new and powerful tool for characterization of cellular protein expression. This method is based on 2 dimensional (2D) electrophoretic separation of the cellular proteins so that each protein can be identified by its specific coordinates in a 2D protein map from which it can be extracted and identified by micro sequencing and mass spectrometry. Our aim is to establish and optimize such 2D protein maps of muscle tissues from cod and pork. Existing methods of tissue preparation, 2D gel separation and computer assisted image analysis of the 2D maps will be optimized. The established 2D maps will be used to study proteins that are involved in post mortem changes of muscle tissue, in order to find and identify marker proteins that can be used as assays for quality labeling.

National Institute of Aquatic Resources
Danish Institute of Agricultural Sciences
Period: 01/07/1999 → 31/05/2003
Number of participants: 3
Project participant:
Kjærsgård, Inger Vibeke Holst (Intern)
Stampe-Villadsen, Hanne Lilian (Intern)
Project Manager, organisational:
Jessen, Flemming (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 5,135,000.00 Danish Kroner
Project

Kvalitet af muskelbaserede fiskeprodukter
Department of Systems Biology
Period: 01/10/1998 → 17/05/2004
Number of participants: 7
Phd Student:
Jensen, Kristina Nedenskov (Intern)
Supervisor:
Jørgensen, Bo Munk (Intern)
Martens, Harald (Intern)
Main Supervisor:
Nielsen, Jette (Intern)
Examiner:
Jessen, Flemming (Intern)
Frisvad, Jens Christian (Intern)
Ofstad, Ragni (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskerakademiets Samfinansier
Project: PhD

Membranbundne enzymer som fryselagringsindikatorer
Department of Systems Biology
Period: 01/03/1997 → 10/09/2001
Number of participants: 5
Phd Student:
Godiksen, Helene (Intern)
Main Supervisor:
Jessen, Flemming (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Nielsen, Robert (Ekstern)
Rehbein, Hartmut (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Program Stipendium-SU, Eksp
Project: PhD

2D og 3D objektmåling til styring og kvalitetskontrol i industrien
Department of Systems Biology
Period: 01/01/1997 → …
Number of participants: 3
Phd Student:
Quality indicators for frozen fish

An important factor for efficient utilisation of the resources of fish is quality assurance in the chain from catch to consumer. Freezing is an effective method for preserving fat and lean fish. In order to reduce the quality loss during processing, storing and distribution it is necessary to obtain better knowledge of the biochemical shelf life indicators of the different species. It is important to create a system of traceability of the fish through the chain for the benefit of the consumer. On the background of the obtained knowledge in the project the objective is to construct a model for labelling of quality, prediction of shelf life and utilisation and to obtain a better freezing stability. The aim is to give guidelines for the optimum handling of fish prior to freezing, the optimum freezing-, storage- and thawing conditions and to collect data necessary for prediction of a production of thawed fish packed in MAP based on raw material frozen-at-sea. The effect of season, catch handling, cold/chilled storage period and temperature is examined.

National Institute of Aquatic Resources
Hoejmark laboratory
Period: 01/01/1997 → 01/03/2002
Number of participants: 6
Project participant:
Jensen, Helle Skov (Intern)
Jørgensen, Bo Munk (Intern)
Jessen, Flemming (Intern)
Jensen, Kristina Nedenskov (Intern)
Godiksen, Helene (Intern)
Project Manager, organisational:
Nielsen, Jette (Intern)

Financing sources
Source: Unknown
Name of research programme: Uendt
Amount: 9,994,630.00 Danish Kroner
Project

Advanced methods for identification and quality monitoring of (heat) processed fish

Objectives: -Development of methods for fish species identification, which are tailored for the various types of heated products. -Evaluation of these methods by collaborative studies. -Testing the suitability of image analysis for interpretation and comparison of electrophoresis gels. -Development of a data base containing physical parameters (isoelectric point and/or molecular weight) of proteins for fish species identification. This reference data base will contain data for raw and heated fish and products. -Evaluation of electrophoretic methods to monitor processing parameters (the heating temperature) of fishery products.

National Institute of Aquatic Resources
Netherlands Institute for Fisheries Research
Federal Research Centre for Fisheries
IFREMER
Instituto Portugues de Investigacao Maritima
CSIC Instituto de Investigaciones Marinas
Rowett Research Institute
National Food Administration
Norwegian Institute of Food, Fisheries and Aquaculture Research

Swedish Institute for Food Research
Period: 01/11/1996 → 31/01/2000
Number of participants: 11
Project participant:
Stampe-Villadsen, Hanne Lilian (Intern)
Luten, Joop (Ekstern)
Rehbein, Hartmut (Ekstern)
Etienne, Monique (Ekstern)
Mendes, Rogério (Ekstern)
Perez-Martin, Ricardo (Ekstern)
Craig, Anne (Ekstern)
Malmheden-Yman, Ingrid (Ekstern)
Martinez, Iciar (Ekstern)
Åkesson, Göran (Ekstern)

Project Manager, organisational:
Jessen, Flemming (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 500,000.00 Danish Kroner

Purification and characterization of TMAOase of saithe and hake.
The intracellular distribution of the enzyme TMAO aldolase (EC 4.1.2.32) is determined from detergent-treated tissue extracts. The enzyme is isolated and purified by chromatography and its properties are studied. Thereby, greater knowledge is gained of the factor that determines the formation of dimethylamine and formaldehyde in frozen fish. This knowledge forms a basis for the possibility of influencing the process that is considered important for quality deterioration during frozen storage.

National Institute of Aquatic Resources

Universidad de Vigo

Period: 01/04/1995 → 31/03/1998
Number of participants: 6
Project participant:
Nielsen, Michael Krogsgaard (Intern)
Jessen, Flemming (Intern)
Berner, Lis (Intern)
Rehbein, Hartmut (Ekstern)
Gonzalez-Soteo, Carmen (Ekstern)

Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,300,000.00 Danish Kroner

Thaw-rigor
The metabolic processes related to rigor mortis in fish during freezing, frozen storage and thawing can be related to quality deterioration. In this project these processes are studied in dependence of time and temperature. A special interest is on the relation between thaw-rigor and quality deterioration during processing of fish. The project shall determine the extent and importance of gaping as a result of thaw-rigor and investigate the potential for thaw-rigor in frozen industrial cod blocks. Based on these results an optimized thawing procedure will be developed in order to increase quality and yield of thawed raw material.
National Institute of Aquatic Resources

Thorfisk A/S
Period: 01/01/1995 → 31/03/1999
Number of participants: 2
Project participant:
Cappeln, Gertrud (Intern)
Project Manager, organisational:
Jessen, Flemming (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,700,000.00 Danish Kroner
Project

Activities:

'The minimum resting period for Atlantic cod (Gadus morhua) to regain pre-stressor status after pumping in a capture-based aquaculture operation'. Abstract and poster presentation at 47th Conference of the West European Fish Technologists’ Association, in Dublin, Ireland.
Period: 9 Oct 2017 → 12 Oct 2017
Jonas Steenholdt Sørensen (Other)
Ole Mejlholm (Other)
Paw Dalgaard (Other)
Flemming Jessen (Other)
National Food Institute
Research Group for Analytical and Predictive Microbiology
Research Group for Food Production Engineering

Description
Sørensen, J.S., Mejlholm, O., Dalgaard, P., Jessen, F. (2017). The minimum resting period for Atlantic cod (Gadus morhua) to regain pre-stressor status after pumping in a capture-based aquaculture operation. Abstract and poster at 47th Conference of the West European Fish Technologists’ Association, 9-12 October, Dublin, Ireland.
Degree of recognition: International

Related event
47th Conference of the West European Fish Technologists’ Association: WEFTA
09/10/2017 → 12/10/2017
Dublin, Ireland
Activity: Talks and presentations › Conference presentations

2DE based proteomics for prediction and understanding of seafood quality
Period: 20 Jun 2012
Flemming Jessen (Lecturer)
National Food Institute
Division of Industrial Food Research

Description
Lecture given at the Ph.D. course in Porto, Portugal:
Proteomics course: gel based protein separation by two-dimensional gel electrophoresis and protein characterization by MALDI-TOF/TOF mass spectrometry.

Organised by
CIIMAR - Centre of Marine and Environmental Research, University of Porto
IPATIMUP - Institute of Molecular Pathology and Immunology of the University of Porto
FCUP - Faculty of Sciences, University of Porto
Related event

Proteomics course: gel based protein separation by two-dimensional gel electrophoresis and protein characterization by MALDI-TOF/TOF mass spectrometry
20/06/2012 → 20/06/2012
Portugal
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities