Publications:

Die Hard - improving the physical quality of extruded fish feed pellets
The present thesis, Die Hard – Improving the Physical Quality of Extruded Fish Feed Pellets, approaches some of the biggest challenges within production of high-performance feed: Oil leakage and pellet strength. Salmon farmers in the aquaculture industry are requesting high energy dense diets with a supreme physical quality. To fulfil the market expectations, feed pellets have to contain 40% fat and tolerate high levels of stress during the transportation to the fish cages – without the pellets crumbling and oil leaking out of the feed. To solve this task, an improved understanding of the pellet structure’s impact on the physical quality of the feed is required. Through detailed analyses of the pellets’ microstructure, it was found that the optimal pore structure is defined by a high pore-surface-area to object-volume ratio. To obtain this pore structure, a new generation of dies was developed. These dies are proven to significantly reduce oil leakage while the overall pellet strength is significantly enhanced. The observations leading to the development of the new dies are published in the enclosed Paper I, whereas an application increasing the utilization of the pores is filed as Patent Application I, and the die technology facilitating an improved pore structure of extruded feed is filed as Patent Application II.
Liquid Holding Capacity and Liquid Leakage of Raw Salmon and Trout Fillets

Liquid loss (i.e. loss of water and liquid fat) is an important property for salmonids when evaluating fish quality in production and as final product. It can be measured by several means, for example by liquid leakage or by liquid holding capacity. The present study examines how liquid leakage and liquid holding capacity of salmon and trout are influenced by fat content. Liquid leakage did not depend on fat content whereas the liquid holding capacity was lower for fish with high fat content. Thus the methods provide supplementary rather than equal information. Furthermore the water loss part was linear depending on liquid loss. The results indicate that fat is more loosely bound in trout than in salmon. These findings may be of immediate relevance to quality control of high-value fat fish products, to assessment of raw material properties, to an efficient treatment in the production and to process control.

Process analysis and data driven optimization in the salmon industry

Aquaculture supplies around 70% of the salmon in the World and the industry is thus an important player in meeting the increasing demand for salmon products. Such mass production calls for systems that can handle thousands of tonnes of salmon without compromising the welfare of the fish and the following product quality. Moreover, the requirement of increased profit performance for the industry should be met with sustainable production solutions. Optimization during the production of salmon fillets could be one feasible approach to increase the outcome from the same level of incoming raw material. Today a lot of data is gathered in the different links of the value chain regarding raw material characteristics and processing parameters. Yet, even though traceability systems that allow for information transfer are available, this type of information does not follow the fish. This means that valuable information is gathered, but not exploited, and that data from for example the slaughtering companies cannot be included in decision processes related to the further processing of the fish or vice versa. Therefore, the overall aim of the present project has been to investigate if comprehensive collection and analysis of data from the salmon industry could be utilized to extract information that will support the industry in their decision-making processes. Mapping of quality parameters, their fluctuations and influences on yield and texture has been investigated. Additionally, the ability to predict the texture category of the salmon based on protein profile has been explored. The potential effect of the current project was expected to result both in a higher share of products of the highest possible quality, and allocation of products to match raw material to optimal product recipe (for example fillet, portion, smoked etc.). These measures could ensure the industry a higher price for the products, and will have a direct impact on the profit of the filleting companies. The initial work comprised a process analysis of the process line at the collaborating partner Skagerak Salmon A/S where data was gathered on an individual level during filleting. A model was built based on
the gathered data enabling prediction of yield after filleting. Moreover, during analysis of the headed salmon it was observed that 78% of the salmon had a larger right side fillet compared to the left side, while all heads had more meat on the left side compared to the right. The heading procedure was identified as the one responsible for the weight difference of the fillets with a potential for increasing the recovery of high value meat i.e. fillet. The difference in fillet size amounted to 23 g per fish, and if recovered 61 tonnes of additional meat a year with a value of 2 million Danish kroner. Furthermore, throughout the project data was gathered covering a total of 11 months in order to investigate the variation in quality parameters. A significant negative correlation between sea temperature at the rearing region and protein content was observed. To the best of my knowledge, no study has reported this previously, and this observation thus segregates from the commonly accepted statement that protein content is a stable parameter in farmed salmon muscle. In the work related to the texture of salmon a model that can predict peak force, and thus texture category, based on protein profile, was built. A total of 16 proteins were required for this prediction, and five proteins; serum albumin, dipeptidyl peptidase 3, heat shock protein 70, annexins, and a protein fragment believed to be titin, were identified. In conclusion, the present project shows how process analysis and extensive data analysis can be used in the salmon industry in the attempt to increase yield. Knowledge of slaughter yield for a certain batch may facilitate optimal planning of the production of salmon fillets by ordering and assigning the right batch to the right product category to obtain an optimal yield and quality. Moreover, it is contemplated that the identification of proteins significant for the measured texture, will contribute to the further understanding of texture. Although more research is still needed in this area, the perspectives extending from the present work may challenge the industry to restructure the information flow of the value chain. This may incorporate an approach that enables all links to receive data that can be used in optimization of processes, and by that achieve an optimal exploitation of the resources in the future.

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Variation in some quality attributes of Atlantic salmon fillets from aquaculture related to geographic origin and water temperature
It is well know that factors like fat content and texture affect the yield when making products from Atlantic salmon (Salmo salar L.). The relation between these factors and other quality attributes like water holding capacity and protein content, however, has received limited attention. To enable an efficient use of the information gathered in the different links of the value chain, a deeper knowledge of the correlations between the various quality attributes and factors like the geographical origin of the salmon, the company and the water temperature of the fish farm, is needed. In the present study a multivariate approach was taken to investigate the variation in some quality parameters (fat, protein, texture, water holding capacity, weight) amongst salmon samples (n = 136) from Norwegian aquaculture in order to establish which parameters were accounting for most of the variation seen in relation to the geographical origin and thereby of the sea temperature at harvest. The protein content of farmed Atlantic salmon sampled at different times of year varied substantially and was significantly correlated to the sea temperature. Fat and water content were also negatively correlated yet the correlation coefficient was numerical lower than what is usually seen in fatty fish, which could be a consequence of the varying protein content. A variation in both texture and water holding capacity was observed between the rearing companies. The present study adds to the existing knowledge regarding texture differences and contributes with new knowledge about the proximate composition of Atlantic salmon from aquaculture. Moreover we show that analysing different parameters holistically may reveal a new dimension in the information regarding differences between companies and regions in relation to the final quality of the filleted salmon.

Statement of relevance
This study confirms the differences in texture observed by the industry and adds to the existing knowledge regarding the proximate composition of Atlantic salmon from aquaculture. Moreover, it shows that analysing different quality parameters holistically may uncover a new dimension in the information regarding differences between companies and regions of Norway in relation to the final quality of the salmon.
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Scopus rating (2015): SJR 1.103 SNIP 1.254 CiteScore 2.12
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Web of Science (2007): Indexed yes
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Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.915 SNIP 1.236
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.016 SNIP 1.627
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Biological variation of the raw material and processing conditions affect the yield and quality of fast-marinated herring

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Organisations: National Food Institute, Research Group for Food Production Engineering
Authors: Ekgreen, M. H. (Intern), Jørgensen, B. M. (Intern), Martinez Lopez, B. (Intern), Frosch, S. (Intern), Jessen, F. (Intern)
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Pilotprojekt for udvikling af fiskeri af strandkrabber til foderproduktion

**General information**
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Organisations: National Food Institute, Research Group for Food Production Engineering
Authors: Fischer, K. (Ekstern), Rasmussen, O. S. (Ekstern), Johansen, N. F. (Ekstern), Cold, U. (Ekstern), Jørgensen, B. M. (Intern)
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Sensory factors in food satisfaction. An understanding of the satisfaction term and a measurement of factors involved in sensory- and food satisfaction

Satisfaction is suggested as a holistic response variable when measuring consumers’ hedonic food appreciation. However, “satisfaction” is a relatively new term within sensory science research. Thus, knowledge is needed about how to interpret the term, and about which factors that influence consumers’ degree of intake related food satisfaction. The main purposes of this PhD project were:
1) to contribute with a theoretical understanding of “food satisfaction” to be used prospectively within sensory science research
2) to develop a method measuring: consumers’ degree of intake related satisfaction and factors influencing food satisfaction
3) to use the method in case studies

Definitions of “satisfaction” which previously had been used within sensory science were analysed according to three factors; type of response, focus in the response and timing of the response. The analysis showed that “satisfaction” could be regarded an affective response to food. The focus of the response varied between definitions. In addition to focus on the intake experience, the food was evaluated based on intake induced physical- and psychological well-being related sensations, and the context in which the food was eaten. The timing of the response varied between definitions. One definition did not imply when to measure satisfaction, others implied that satisfaction could be measured after intake. The analysis of the satisfaction terms was employed to develop working definitions of satisfaction which should be used prospectively in the PhD project; a definition of “sensory satisfaction” and a definition of “food satisfaction”. In “sensory satisfaction” focus was on the foods sensory properties. The definition of “food satisfaction” could be regarded “broader” in the sense that a holistic approach was used. The food was evaluated with focus on the context in which it was consumed, and intake related physical- and psychological sensations.

Focus group interviews were used to initiate the study of factors influencing food satisfaction among consumers. Results from the focus group studies showed that factors within the categories “product”, “person” and “context” influenced consumers’ degree of “food satisfaction”. Further, a temporal perspective was indicated, regarding when each factor was relevant for food satisfaction. Some factors were present before intake, whereas others became relevant during- and after intake. The results from the focus group interviews formed the basis of the development of a set of questionnaires; to be answered by consumers before-, during- and after food intake. The development questionnaires were further based on: the work on analysing the satisfaction terms and a model of factors affecting food choice and behaviour, developed by Jos Mojet. In addition to measure consumers degree of “sensory” and “food satisfaction” the questionnaires were used to measure factors influencing “food satisfaction”. The questionnaires were developed so that they could be applied on a broad range of foods.

The set of questionnaires were used in three product cases; a consumer study on creamy chicken soups, a consumer study on yoghurt with/mueslis, conducted in a lab context and a natural context respectively, and a consumer study on cherry-apple fruit drinks. The study on creamy chicken soups utilised the original set of questionnaires. For the study on yoghurt with/mueslis, an extra questionnaire was included, to measure influential factors in food satisfaction one hour after intake. Finally, for the study on fruit drinks, a set of questionnaires were developed with increased focus at physical well-being related sensations. Objective sensory analysis was conducted on products included in each consumer study. To study sensory attributes influential in sensory satisfaction, the results from sensory analysis was related consumers rating of “sensory satisfaction”.

In each consumer study, data was analysed to find factors influential in food satisfaction. Overall, the consumer studies showed that factors within the classifications: “product-person interrelated-“, “person related-“ and “context related-“ factors, influenced food satisfaction. Though the concrete factors varied between studies, several factors were repeatedly found influential in food satisfaction. Among those were: “sensory satisfaction”, “reason for ending intake”, “hunger”, “fullness”, “product performance compared to expectations”, “general liking of food type”, “energy level after intake”, “age” and “BMI”.

This PhD project contributes with a theoretical description and discussion of; the terms “sensory satisfaction” and “food satisfaction”, how the terms can be used within sensory research and influential factors in food satisfaction. “Sensory satisfaction” can be used as an alternative to the traditionally used response variable “overall liking”, where focus is at the hedonic experience of the foods sensory properties. However, more studies are needed to clarify how “sensory satisfaction” is different from “overall liking”. “Food satisfaction” can be used as a holistic term for food appreciation. In order to be able to generalise the results found in the present PhD project, studies are needed which utilise a broader range of products within the same food category, as well as studies that compare results between food categories.

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Automatic scatter detection in fluorescence landscapes by means of spherical principal component analysis

In this paper, we introduce a new method, based on spherical principal component analysis (S-PCA), for the identification of Rayleigh and Raman scatters in fluorescence excitation–emission data. These scatters should be found and eliminated as a prestep before fitting parallel factor analysis models to the data, in order to avoid model degeneracies. The work is inspired and based on a previous research, where scatter removal was automatic (based on a robust version of PCA called ROBPCA) and required no visual data inspection but appeared to be computationally intensive. To overcome this drawback, we implement the fast S-PCA in the scatter identification routine. Moreover, an additional pattern interpolation step that complements the method, based on robust regression, will be applied. In this way, substantial time savings are gained, and the user's engagement is restricted to a minimum, which might be beneficial for certain applications. We conclude that the subsequent parallel factor analysis models fitted to excitation–emission data after scatter identification based on either ROBPCA or S-PCA are comparable; however, the modified method based on S-PCA clearly outperforms the original approach in relation to computational time.

General information
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Organisations: Department of Applied Mathematics and Computer Science , Statistics and Data Analysis, National Food Institute, Division of Industrial Food Research
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BFI (2014): BFI-level 2
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Scopus rating (2012): SJR 0.66 SNIP 1.342 CiteScore 2.03
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Scopus rating (2011): SJR 0.742 SNIP 1.037 CiteScore 1.66
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BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.931 SNIP 1.008
Web of Science (2009): Indexed yes
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Scopus rating (2008): SJR 0.868 SNIP 0.903
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.829 SNIP 1.097
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A study of traceability and quality assurance in fish supply chains

General information
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Organisations: National Food Institute, Division of Industrial Food Research, Department of Management Engineering
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On the track of fish batches in three distribution networks
Three fish products sampled in retail shops were traced back to their origin and fish from the same batch were tracked forward towards the retailer, thereby simulating a recall situation. The resulting distribution networks were very complex, but to the extent that companies were willing to provide the necessary information, it was possible to locate the end destinations of the fish batches. The batch sizes and the number of companies involved clearly rose when batch joining occurred. Thus, a fault in a small batch can potentially have widespread implications. The study also underlines the importance of discovering a fault as early as possible in order to minimise the costs of a recall. The localisation of distributed products during a recall operation can be facilitated by a well-constructed traceability system.

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Organisations: National Food Institute, Division of Industrial Food Research, Technical University of Denmark
Authors: Randrup, M. (Ekstern), Wu, H. (Intern), Jørgensen, B. M. (Intern)
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Sensory Properties of Frozen Herring (Clupea harengus) from Different Catch Seasons and Locations

Freezing of herring (Clupea harengus) for human consumption is increasing in the Nordic herring industry, either onboard the fishing vessels or right after landing. The quality of frozen herring as a raw material does not only depend on the frozen storage conditions applied, but also on compositional features, something which in turn can vary with season and catching ground. To unravel the link between biological variations, basic muscle composition, and sensory properties of frozen herring, a unique herring raw material was caught by commercial fishing vessels at three locations: around Iceland, outside the Norwegian coast, and in Kattegat/Skagerrak. The samplings were done according to a specific scheme and conducted over several seasons and 2 years. The herring was converted into butterfly fillets, packed in cardboard boxes, frozen, and then stored at –20 °C or –80 °C for up to 18 mo. The sensory quality was characterized by objective sensory profiling. It was shown that two generalized sensory variables could be defined from a principal component analysis of the sensory data. Except for the expected pronounced effect from storage time, the most distinct variation followed the lipid content, which in turn varied with season. An unexpected conclusion was that catching location only had a minor affect on the changes in sensory quality of herring during frozen storage. Knowledge about how season and catching location affect herring during frozen storage will be useful for optimizing the utilization of herring for frozen storage for human consumption.

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Organisations: National Food Institute, Division of Industrial Food Research, Chalmers University of Technology, Institute of Marine Research, Icelandic Food Research
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BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.011 SNIP 1.079 CiteScore 2.24
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.978 SNIP 1.086 CiteScore 1.98
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.934 SNIP 1.058 CiteScore 1.9
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
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Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.969 SNIP 1.001
Effect of frozen storage temperature on quality-related changes in rainbow trout (Oncorhynchus mykiss)

The effect of frozen storage temperature on quality-related parameters of rainbow trout (Oncorhynchus mykiss) muscle was studied in the interval from -10 to -80°C on samples stored for 1 to 18 months. The following quantities were measured: drip loss, water holding capacity and water distribution, color, lipid oxidation (thiobarbituric acid-reactive substances, TBARS), and membrane stability (enzyme activity). No effect of temperature on drip loss, water holding capacity, water distribution, or membrane stability was observed for samples stored below -20°C, whereas storage at -40°C or lower compared to -30°C or higher resulted in a reduced level of secondary lipid oxidation (TBARS). No advantage was gained by using temperatures below -40°C for frozen storage of trout regarding any of the properties investigated.

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Organisations: National Food Institute, Division of Seafood Research
Authors: Burgaard, M. G. (Intern), Jørgensen, B. M. (Intern)
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BFI (2015): BFI-level 1
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Effect of frozen storage temperature on quality-related changes in fish muscle: Changes in physical, chemical and biochemical quality indicators during short- and long-term storage

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Organisations: Division of Seafood Research, National Food Institute
Authors: Burgaard, M. G. (Intern), Jørgensen, B. (Intern)
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Chemical processes responsible for quality deterioration in fish

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Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry, Section for Aquatic Process and Product Technology
Authors: Jacobsen, C. (Intern), Nielsen, H. H. (Intern), Jørgensen, B. (Intern), Nielsen, J. (Intern)
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Cod and rainbow trout as freeze-chilled meal elements

Meal elements' are elements of a meal, e.g. portions of pre-fried meat, sauces, frozen fish or pre-processed vegetables typically prepared industrially. The meal elements are distributed to professional satellite kitchens, where the staff can combine them into complete meals. Freeze-chilling is a process consisting of freezing and frozen storage followed by thawing and chilled storage. Combining the two would enable the manufacturer to produce large quantities of frozen meal elements to be released into the chill chain according to demand. We have studied the influence of freeze-chilling on the quality attributes of cod and rainbow trout portions. Sensory profiling and chemical analyses were used to determine the changes in quality after slow thawing and subsequent chill storage and to find the high-quality shelf life. RESULTS: Cod had a consistent and high sensory quality during the first 6 days of chilled storage, and the corresponding time for rainbow trout was 10 days. After this period the sensory quality decreased and chemical indicators of spoilage were seen to increase. CONCLUSION: The consistent quality during storage and the high-quality shelf life are practically applicable and cod and rainbow trout seem potential candidates for freeze-chilled meal elements. (C) 2009 Society of Chemical Industry

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Effect of temperature on quality-related changes in cod (Gadus morhua) during short- and long-term frozen storage.

Cod (Gadus morhua) was stored at eight temperatures (-10 to -80 degrees C) for 1 to 18 months, after which quality indicators were measured including drip loss, water holding capacity, low field NMR spin-spin relaxation, color, amount of thiobarbituric acid reactive substances, and sarcoplasmic reticulum Ca2+-ATPase and lysosomal Cathepsin D activities. Results from samples stored up to 12 months showed no significant differences between -30 degrees C and lower temperatures. The NMR measurements, however, indicated some changes in the water distribution of samples stored at -30 degrees C for 12 or more months compared to storage at -40 degrees C or lower.
Latitudinal patterns in the abundance of major marine bacterioplankton groups

This study describes the abundance of major marine bacterioplankton taxa and two bacterial genera (Pseudoalteromonas and Vibrio) in surface seawater at 24 stations around the world. Catalyzed Reporter Deposition-Fluorescence in situ Hybridization (CARD-FISH) showed that Alphaproteobacteria (average relative abundance 37%, average absolute abundance 3.7×10⁵ cells mL⁻¹) including SAR11 (30%/3×10⁵), Gammaproteobacteria (14%/1.2×10⁵), and Bacteroidetes (12%/1.3×10⁵) globally dominated the bacterioplankton. The SAR86 clade (4.6%/4.1×10⁴) and Actinobacteria (4.5%/4.1×10⁴) were detected ubiquitously, whereas Archaea were scarce (0.6%/4.2×10³). The Roseobacter clade (averaging 3.8%/3.5×10⁴), Pseudoalteromonas (2.6%/2.1×10⁴), and Vibrio (1.5%/1.3×10⁴) showed cosmopolitan occurrence. Principal Component Analysis revealed a latitudinal pattern in bacterial abundances by clustering samples according to lower and higher latitudes. This was related to significantly different relative abundances of Bacteroidetes (peaking at higher latitudes), unclassified Bacteria and Vibrio (both peaking at lower latitudes) between warmer and colder oceans. Relative abundances of Alphaproteobacteria (peaking at subtropical) and Gammaproteobacteria (polar stations) varied between major oceanic regions (biomes), as did absolute abundances of Roseobacter (peaking at temperate and polar stations). For almost all groups absolute abundances were positively correlated with nutrient concentrations in warmer oceans, and negatively with oxygen saturation in colder oceans. On a global scale, Roseobacter and SAR86 were correlated with chlorophyll a. Linkages of environmental parameters with relative abundances were more complex, with e.g. Bacteroidetes being associated with chlorophyll a. The finding of differing communities in warmer and colder oceans underlined the presence of biogeographical patterns among marine bacteria and the influence of environmental parameters on bacterial distribution.

General information
State: Published
Organisations: Division of Seafood Research, National Food Institute
Authors: Wietz, M. (Intern), Gram, L. (Intern), Jørgensen, B. (Intern), Schramm, A. (Ekstern)
Pages: 179-189
Publication date: 2010
Sensory quality of seafood – in the chain from catch to consumption

General information
State: Published
Organisations: Division of Seafood Research, National Food Institute
Authors: Green-Petersen, D. (Intern), Jørgensen, B. (Intern), Nielsen, J. (Intern), Hyldig, G. (Intern)
Number of pages: 166
Publication date: 2010

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.

General information
State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, Division of Seafood Research, National Institute of Aquatic Resources
Authors: Kristiansen, L. C. (Intern), Jacobsen, S. (Intern), Jessen, F. (Intern), Jørgensen, B. (Intern)
Pages: 1721-1723
Publication date: 2010
Main Research Area: Technical/natural sciences

Publication information
Journal: Proteomics
Volume: 10
Issue number: 8
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
A fully robust PARAFAC method for analyzing fluorescence data

Parallel factor analysis (PARAFAC) is a widespread method for modeling fluorescence data by means of an alternating least squares procedure. Consequently, the PARAFAC estimates are highly influenced by outlying excitation-emission landscapes (EEM) and element-wise outliers, like for example Raman and Rayleigh scatter. Recently, a robust PARAFAC method that circumvents the harmful effects of outlying samples has been developed. For removing the scatter effects on the final PARAFAC model, different techniques exist. Newly, an automated scatter identification tool has been constructed. However, there still exists no robust method for handling fluorescence data encountering both outlying EEM landscapes and scatter. In this paper, we present an iterative algorithm where the robust PARAFAC method and the scatter identification tool are alternately performed. A fully automated robust PARAFAC method is obtained in that way. The method is assessed by means of simulations and a laboratory-made data set.

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Engelen, S. (Ekstern), Frosch, S. (Intern), Jørgensen, B. (Intern)
Pages: 124-131
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Chemometrics
Volume: 23
outliers, fluorescence, robust PARAFAC, Raman and Rayleigh scatter

DOIs:
10.1002/cem.1208

Links:
http://www3.interscience.wiley.com/globalproxy.crt.dk/cgi-bin/fulltext/121581665/PDFSTART

Source: orbit
Source-ID: 242826
Data handling by multivariate data analysis

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern)
Pages: 444-457
Publication date: 2009

Host publication information
Title of host publication: Fishery products : quality, safety and authenticity
Publisher: Wiley-Blackwell
Editor: Rehbein, H.
ISBN (Print): 978-1-4051-4162-8
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 253720
Publication: Research - peer-review › Book chapter – Annual report year: 2009

Freeze-chilling af fisk til brug som måltidselementer

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jensen, L. (Ekstern), Nielsen, J. (Intern), Jørgensen, B. (Intern), Frosch, S. (Intern)
Publication date: 2009
Event: Poster session presented at Forskningensdøgn, København
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252910
Publication: Research › Poster – Annual report year: 2009

Optimal food quality by online acoustic methods and chemometrics: Prediction of the degree of glazing of single frozen prawns by acoustics

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Frosch, S. (Intern), Cold, U. (Intern), Jørgensen, B. (Intern)
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: 252903
Publication: Research › Poster – Annual report year: 2009

Quality effect of freeze-chilling in cod and rainbow trout

‘Meal elements’ is the name of a concept in which elements of a meal, e.g. portions of pre-fried meat, sauces, fish or pre-processed vegetables are prepared industrially. The meal elements are distributed to professional satellite kitchens for instance in hospitals and canteens, where the kitchen staff combines the different meal components to a complete meal.

Freeze-chilling is a process consisting of freezing and frozen storage followed by thawing and chilled storage and could be an ideal technique to combine with the concept of meal elements. Freeze-chilling would enable manufacturers to produce large quantities of frozen meal elements to be released into the chill chain according to market demands. This procedure would allow the products to thaw during transport, and by arrival the thawed meal elements would be ready for use or chill storage.

We have studied the influence of freeze-chilling on the quality of raw fish portions as an example of a meal element. The thawing of frozen products during transport was mimicked by placing cardboard boxes with frozen, vacuum packaged portions of fish in a chilling facility and allowing them to thaw slowly. To mimic possible subsequent chill storage at the satellite kitchens the quality was also followed during a storage period.

The quality changes were evaluated on the basis of the results from descriptive sensory analysis and analysis of different
chemical parameters. The high quality shelf life was determined from these results. As the quality changes are known to differ among fish species, the present study included the popular species cod (Gadus Morhua) and rainbow trout (Oncorhynchus Mykiss).

Principal component analysis of the sensory results clearly showed that after frozen storage at -30 °C for 1 month and subsequent chill storage at +2 °C, trout had a shelf life of approximately 10 days as a high quality product which was perceived indistinctly from the freshly thawed samples by the sensory panel. The corresponding high quality shelf life for cod was 6 days.

In conclusion, the consistent quality during storage and the high quality shelf life is practically applicable and cod and rainbow trout seem potential candidates for freeze-chilled meal elements.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Jensen, L. H. S. (Intern), Nielsen, J. (Intern), Jørgensen, B. (Intern), Frosch, S. (Intern)
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: 252908
Publication: Research › Poster – Annual report year: 2009

**Auto-fluorescence of fish muscle juice. Resolution into components by robust PARAFAC with automatic scatter correction**

**General information**
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Frosch, S. (Intern), Jørgensen, B. (Intern)
Publication date: 2008
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 242005
Publication: Research › Paper – 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
Ratings:
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.
Frozen storage of herring from different stocks and catching seasons. Changes in the sensory attributes

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Hyldig, G. (Intern), Møller, J. U. (Intern), Sørensen, R. (Intern), Jørgensen, B. (Intern), Nielsen, H. H. (Intern)
Publication date: 2007
Event: Abstract from 37th WEFTA Conference Seafood, Lisbon, Portugal.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 229306
Publication: Research › Conference abstract for conference – Annual report year: 2007

Frozen storage of herring from different stocks and catching seasons. Effects on lipid oxidation

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Larsson, L. (Ekstern), Almgren, A. (Ekstern), Jørgensen, B. (Intern), Olsen, R. (Ekstern), Undeland, I. (Ekstern)
Publication date: 2007
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 229361
Publication: Research › Paper – Annual report year: 2007

Frozen storage of herring from different stocks and catching seasons. Effects on microstructure

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Holsteinssom, H. (Ekstern), Klonowski, I. (Ekstern), Gunnlaugsson, V. (Ekstern), Olsen, R. (Ekstern), Jørgensen, B. (Intern), Hyldig, G. (Intern)
Publication date: 2007
Event: Abstract from 37th WEFTA Conference Seafood, Lisbon, Portugal.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 229304
Publication: Research › Conference abstract for conference – Annual report year: 2007

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.

General information
State: Published
Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Enzyme and Protein Chemistry, Department of Systems Biology, Section for Aquatic Protein Biochemistry, Section for Aquatic Process and Product Technology, Center for Microbial Biotechnology, Norwegian Food Research Institute
Peak alignment and robust principal component analysis of gas chromatograms of fatty acid methyl esters and volatiles

Gas chromatograms of fatty acid methyl esters and of volatile lipid oxidation products from fish lipid extracts are analyzed by multivariate data analysis [principal component analysis (PCA)]. Peak alignment is necessary in order to include all sampled points of the chromatograms in the data set. The ability of robust algorithms to deal with outlier problems, including both sample-wise and element-wise outliers, and the advantages and drawbacks of two robust PCA methods, robust PCA (ROBPCA) and robust singular value decomposition when analysing these GC data were investigated. The results show that the usage of ROPCA is advantageous, compared with traditional PCA, when analysing the entire profile of chromatographic data in cases of sub-optimally aligned data. It also demonstrates how choosing the most robust PCA (sample or element-wise) depends on the type of outliers present in the data set.
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

Water distribution in smoked salmon

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Løje, H. (Intern), Green-Petersen, D. (Intern), Nielsen, J. (Intern), Jørgensen, B. (Intern), Jensen, K. N. (Intern)
Pages: 212-217
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of the Science of Food and Agriculture
Volume: 87
Issue number: 2
ISSN (Print): 0022-5142
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 2.48 SJR 0.87 SNIP 1.222
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.813 SNIP 1.088 CiteScore 2.11
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.819 SNIP 1.153 CiteScore 2.1
Web of Science (2014): Indexed yes
Use of multivariate analysis in the transformation of 2D gel images into relevant spot quantity data

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources, Section for Aquatic Protein Biochemistry
Authors: Jensen, K. (Ekstern), Søndergaard, I. (Ekstern), Jacobsen, S. (Ekstern), Jørgensen, B. (Intern), Jessen, F. (Intern)
Publication date: 2006
Event: Poster session presented at 7th Siena meeting from genome to proteome, September 3rd - 7th, Siena, Italy
Main Research Area: Technical/natural sciences

Bibliographical note
Water distribution and mobility in fish products in relation to quality

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern), Jensen, K. N. (Intern)
Pages: 905-908
Publication date: 2006

Host publication information
Title of host publication: Modern magnetic resonance. Part 1: Applications in chemistry, biological and marine sciences
Place of publication: Berlin
Publisher: Springer
Editor: Webb, G.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 226107
Publication: Research - peer-review › Book chapter – Annual report year: 2006

Water distribution and mobility in herring muscle in relation to lipid content, season, fishing ground and biological parameters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology, Section for Aquatic Protein Biochemistry
Authors: Jensen, K. N. (Intern), Jørgensen, B. (Intern), Nielsen, H. H. (Intern), Nielsen, J. (Intern)
Pages: 1259-1267
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of the Science of Food and Agriculture
Volume: 85
Issue number: 8
ISSN (Print): 0022-5142
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 2.48 SJR 0.87 SNIP 1.222
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.813 SNIP 1.088 CiteScore 2.11
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.819 SNIP 1.153 CiteScore 2.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.846 SNIP 1.224 CiteScore 2.22
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.891 SNIP 1.129 CiteScore 1.9
Multisensor for fish quality determination

The European fish industry is still reluctant to implement methods other than sensory to monitor freshness and quality of fish products, although general consensus exists about the importance of various quality attributes and the need for methods to monitor quality. The objective of the project FAIR CT98-4076 (MUSTEC) was to evaluate several physico-chemical techniques and to integrate their outputs into a more robust estimate of the freshness quality of fish. The techniques used for this multisensor approach were based on visible light spectroscopy, electrical properties, image analysis, colour, electronic noses and texture. Combining the outputs of the instrumental techniques and calibrating them with sensory scores of Quality Index Method (QIM) for attributes like appearance, smell and texture, gives an Artificial Quality Index (AQI) that can be as accurate and precise as the QIM sensory score. The outcome provides a basis for the construction and industrial exploitation of multi-sensor-devices for defining the quality of fish.

General information

State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Olafsdottir, G. (Ekstern), Nesvadba, P. (Ekstern), Di Natale, C. (Ekstern), Careche, M. (Ekstern), Tryggvadottir, S. (Ekstern), Schubring, R. (Ekstern), Kroeger, M. (Ekstern), Heia, K. (Ekstern), Esaiassen, M. (Ekstern), Macagnano, A. (Ekstern), Jørgensen, B. (Intern)
Pages: 86-93
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication Information

Journal: Trends in Food Science & Technology
On the relation between water pools and water holding capacity in cod muscle

Low-field 1H nuclear magnetic resonance (NMR) relaxations were measured on muscle, minced muscle and centrifuged mince from cod that had been treated under various frozen and chill storage conditions. By using multi-way chemometrics, uni-exponential profiles were obtained, from which the transverse relaxation times (T2-values) and the water pool sizes (m-values) were determined. Three pools of water were identified with the different relaxation times and m-values in the centrifuged samples reflecting the removal of loosely bound water. The m-values and the full NMR-signal decays were correlated to two measures of water holding capacity (WHC) in a way that WHC related to the original water content could be predicted well for the whole and the minced muscle. The centrifuged samples gave optimal predictions of WHC related to the dry matter content, probably because the centrifuged samples are similar to the samples used for measuring WHC. The two WHC quantities were also correlated to the water distribution itself as measured by the relative pool sizes. © 2004 by The Haworth Press, Inc. All rights reserved.
Quantitative relationship between trimethylamine-oxide aldolase activity and formaldehyde accumulation in white muscle from gadiform fish during frozen storage

The accumulation of formaldehyde and the resulting deterioration of seafood products during frozen storage are primarily caused by the enzymatic activity of trimethylamine oxide aldolase (TMAOase). A screening of muscle samples from 24 species showed TMAOase activity in only the nine gadiform species that were analyzed. Enzyme activities in the major white muscle of gadiform fish showed large variations between species as well as between individuals. A frozen storage experiment showed a similarly large variation in the rate of formaldehyde accumulation, which could be accounted for by the endogenous white muscle in situ TMAOase activity. This TMAOase activity also correlated with the rate of insolubilization of otherwise high ionic strength soluble protein. A simple model describing the accumulation of free formaldehyde during frozen storage of gadiform fish is proposed. The model is based on a storage time-dependent decay of substrate-saturated white muscle TMAOase activity.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Nielsen, M. K. (Intern), Jørgensen, B. (Intern)
Pages: 3814-3822
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 52
Issue number: 12
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
A study of the attitudes of the European fish sector towards quality monitoring and labelling

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Pages: 57-75
Effect of storage conditions on differential scanning calorimetry profiles from thawed cod muscle

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Jensen, K. N. (Intern), Jørgensen, B. (Intern)
Pages: 807-812
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Lebensmittel-Wissenschaft und Technologie
Volume: 36
Issue number: 8
ISSN (Print): 0023-6438
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 3.31
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.11
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.12
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.11
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.12
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 3.18
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
BFI (2009): BFI-level 1
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2005): Indexed yes
Web of Science (2004): Indexed yes
Web of Science (2003): Indexed yes
Low-temperature transitions in cod and tuna determined by differential scanning calorimetry
Differential scanning calorimetry measurements have revealed different thermal transitions in cod and tuna samples. Transition temperatures detected at -11°C, -15°C and -21°C were highly dependent on the annealing temperature. In tuna muscle an additional transition was observed at -72°C. This transition appeared differently than the thermal events observed at higher temperatures, as it spanned a broad temperature interval of 25°C. The transition was comparable to low-temperature glass transitions reported in protein-rich systems. No transition at this low temperature was detected in cod samples. The transitions observed at higher temperatures (-11°C to -21°C) may possibly stem from a glassy matrix containing muscle proteins. However, the presence of a glass transition at -11°C was in disagreement with the low storage stability at -18°C during practical time scales. It was proposed that freezing of cod could be associated with more than one glass transition, with a glass transition at a temperature lower than -11°C being too small to be detectable with instrument, yet governing important deterioration processes. In order to optimize frozen storage conditions, the relationship between deterioration processes important for preservation of quality and glass transition temperatures still needs to be established. (C) 2003 Swiss Society of Food Science and Technology. Published by Elsevier Science Ltd. All rights reserved.
Quality Index Method (QIM) scheme developed for farmed Atlantic salmon (Salmo salar)

The aim of the study was to develop a Quality Index Method (QIM) scheme for raw, farmed Atlantic salmon (Salmo salar) and to evaluate the scheme in a shelf life study. QIM is based on the evaluation of key parameters in the deterioration of seafoods. Demerit points are assigned to selected parameters according to their importance and a Quality Index (QI) is established by cumulating the resulting scores. The maximum storage time in ice was determined with Quantitative Descriptive Analysis (QDA) of the salmon after cooking and found to be 20-21 days. This was used as a reference to enable prediction of the remaining storage time of raw salmon in ice with QIM. The calculated QI evolved linearly with storage time in ice (QI=0.82x (days in ice)+0.18, R²=0.97). Individual salmon varied in QI within each storage day. However, the multivariate analysis (PLS1) demonstrated that storage time could be predicted with an accuracy of +/-1.5 days, assuming that five salmon from each batch were included in the QIM assessment. (C) 2002 Elsevier Science Ltd. All rights reserved.
Application of Quality Index Method (QIM) scheme in shelf-life study of farmed Atlantic salmon (Salmo salar)

Salmon (Salmo salar) was stored in ice up to 24 d, and changes during storage were observed with sensory evaluation using the Quality Index Method (QIM), and Quantitative Descriptive Analysis (QDA), total viable counts (TVC), hydrogen sulfide (H2S)-producing bacteria, and instrumental texture measurements (compression test). Maximum storage time in ice was determined with QDA and fat content by Soxhlet extraction. A high correlation between QIM and storage time in ice was found. Storage time could be predicted with +/- 2 d. TVC increased exponentially with storage and was dominated by H2S-producing bacteria after 20 d in ice, which was the maximum storage time. Texture measurements indicated softening of salmon flesh with storage.

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Sveinsdóttir, K. (Ekstern), Martinsdóttir, E. (Ekstern), Hyldig, G. (Intern), Jørgensen, B. (Intern), Kristbergsson, K. (Ekstern)
Pages: 1570-1579
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Food Science
Volume: 67
Issue number: 4
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
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), Kjærsgård, 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
- 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
Multi-sensor til kvalitetsbedømmelse af fersk fisk: Kombination af forskellige måleprincipper kan give en hurtig og ikke-destruktiv bestemmelse af det sensoriske kvalitetsindex

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern)
Pages: 20-22
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Plus proces
Volume: 16
Issue number: 1
ISSN (Print): 0902-5057
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
BFI (2016): BFI-level 1
BFI (2015): BFI-level 1
BFI (2014): BFI-level 1
BFI (2013): BFI-level 1
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
BFI (2009): BFI-level 1
BFI (2008): BFI-level 1
Original language: Danish
Source: orbit
Source-ID: 226105
Publication: Research - peer-review » Journal article – Annual report year: 2002

Multivariate data analysis as a tool in advanced quality monitoring in the food production chain
This paper summarizes some recent advances in mathematical modeling of relevance in advanced quality monitoring in the food production chain. Using chemometrics-multivariate data analysis - it is illustrated how to tackle problems in food science more efficiently and, moreover, solve problems that could not otherwise be handled before. The different mathematical models are all exemplified by food related subjects to underline the generic use of the models within the food chain. Applications will be given from meat, storage, vegetable characterization, fish quality monitoring and industrial food processing, and will cover areas such as analysis of variance, monitoring and handling of sampling variation, calibration, exploration/data mining and hard modeling. (C) 2002 Elsevier Science Ltd. All rights reserved.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Bro, R. (Ekstern), van den Berg, F. (Ekstern), Thybo, A. (Ekstern), Andersen, C. M. (Ekstern), Jørgensen, B. M. (Intern), Andersen, H. (Ekstern)
Multivariate spectrometric methods for determining quality attributes

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern)
Pages: 475-493
Publication date: 2002

Host publication information
Title of host publication: Safety and quality issues in fish processing
Place of publication: Cambridge
Publisher: Woodhead Publishing
Editor: Bremner, H.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 226106
Publication date: 2002

Simultaneous determination of ammonia, dimethylamine, trimethylamine and trimethylamine-N-oxide in fish extracts by capillary electrophoresis with indirect UV-detection
A capillary electrophoretic method with indirect UV detection is described for simultaneous determination of ammonia, dimethylamine (DMA), trimethylamine (TMA) and trimethylamine-N-oxide (TMAO) in aqueous extracts of fish. A buffer consisting of 4 mM formic acid, 5 mM copper(II)sulfate and 3 mM crown ether 18-crown-6 enabled separation of the analytes in 5-10 min. The use of an extended light path capillary technique resulted in a good sensitivity and repeatability. The linear dynamic range, based on a hydrostatic injection at 50 mbar for 2 s, was from the detection limit to at least 2.5 mM. The detection limit for ammonia, DMA, TMA, and TMAO was less than 0.04 mM, corresponding to 2 mg nitrogen per 100 g fish. As an extra benefit, the method also provided a quantitative determination of potassium, sodium, calcium and magnesium ions. (C) 2002 Elsevier Science Ltd. All rights reserved.

General information
State: Published
Organisations: Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Timm Heinrich, M. (Intern), Jørgensen, B. (Intern)
Pages: 509-518
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Chemistry
Volume: 76
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
Three-way modelling of NMR relaxation profiles from thawed cod muscle

Low-field \(^1\text{H}\) nuclear magnetic resonance transverse relaxation was used to measure water mobility and distribution in cod stored at -20°C or -30°C for up to 12 months and subsequently from 0 to 21 days in modified atmosphere at +2°C. The relaxation profiles were decomposed by parallel factor analysis resulting in four first-order relaxation curves from which the relative water pool sizes and the transverse relaxation times (T2) were calculated. The T2-values of the four identified water pools were 37 ms, 56 ms, 126 ms and 361 ms, respectively. The relative size of the water pools, but not the relaxation times, depended on the frozen storage temperature and on the chilled storage period.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Department of Informatics and Mathematical Modeling, Section for Aquatic Process and Product Technology
Authors: Jensen, K. N. (Intern), Guldager, H. S. (Intern), Jørgensen, B. M. (Intern)
Localization of formaldehyde production during frozen storage of European hake (Merluccius merluccius)

The formation of dimethylamine and formaldehyde from trimethylamine N-oxide by the enzyme trimethylamine N-oxide demethylase in whole hake during frozen storage was studied. The objective was to check if there were parts of the muscle with a higher production of dimethylamine and formaldehyde, and if the presence of kidney during frozen storage had any significant influence on the production. Three variables were examined through one year storage. The first was anatomical location, considering the red muscle and three zones of white muscle, one located right over the kidneys, the dorsal part over the viscera, and the tail. The second variable was the temperature of storage, -11 degrees C or -18 degrees C. Finally, the influence of kidneys during storage, comparing fish with and without kidneys, was also evaluated. No differences were found in dimethylamine and formaldehyde production between fish with and without kidneys stored at -18 degrees C. However, at -11 degrees C the amounts of dimethylamine and formaldehyde detected in fish without kidneys were, in some cases, higher than in those with kidneys. Kidney removal does not have a statistically significant influence on DMA and FA production in frozen storage hake. Differences in dimethylamine and formaldehyde values among different anatomical locations were found, especially in those stored over one year. It was found that, in general, the white muscle located right over the kidneys produced more dimethylamine than other parts of the fish.

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Pages: 43-47
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: European Food Research and Technology
Volume: 213
Issue number: 1
ISSN (Print): 1438-2377
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 0.742 SNIP 0.882 CiteScore 1.81
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.732 SNIP 0.822 CiteScore 1.55
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.828 SNIP 0.908 CiteScore 1.71
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.791 SNIP 0.901 CiteScore 1.71
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.872 SNIP 1.038 CiteScore 1.68
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.009 SNIP 1.097 CiteScore 1.87
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
A sensitive trimethylamine-N-oxide aldolase assay in two steps without deproteinisation

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Nielsen, M. K. (Intern), Havemeister, W. (Ekstern), Rehbein, H. (Ekstern), Sotelo, C. (Ekstern), Jørgensen, B. (Intern)
Pages: 197-200
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of the Science of Food and Agriculture
Volume: 80
Issue number: 2
ISSN (Print): 0022-5142
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 2.48 SJR 0.87 SNIP 1.222
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.813 SNIP 1.088 CiteScore 2.11
Web of Science (2015): Indexed yes
Quantitative relation between in vitro TMAOase activity and in situ formaldehyde formation

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Nielsen, M. K. (Intern), Jørgensen, B. (Intern)
Number of pages: 379
Publication date: 2000

Host publication information
Title of host publication: Proceedings of 29th WEFTA Meeting, 10 - 14 October, 1999 - Leptocarya - Pieria, Greece
Place of publication: Thessaloniki
Evaluation of Fish Freshness by physical measurement techniques

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Heia, K. (Ekstern), Sigernes, F. (Ekstern), Nielsen, H. (Ekstern), Oehlenschläger, J. (Ekstern), Schubring, K. (Ekstern), Borderias, J. (Ekstern), Nilsson, K. (Ekstern), Jørgensen, B. (Intern), Nesvadba, P. (Ekstern)
Pages: 347-354
Publication date: 1998

Host publication information
Title of host publication: Methods to Determine the Freshness of Fish in Research and Industry
Place of publication: Paris
Publisher: IIR
Main Research Area: Technical/natural sciences

Bibliographical note
Proceedings of the Final Meeting of the Concerted Action "Evaluation of Fish Freshness" AIR3CT94 2283
Source: orbit
Source-ID: 225719
Publication: Research - peer-review › Book chapter – Annual report year: 1998

Modern methods of lipid analysis

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern)
Pages: 5-6
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipidforum News
Volume: 55
Original language: English
Source: orbit
Source-ID: 226104
Publication: Research › Journal article – Annual report year: 1998

Modern methods of lipid analysis
Report from a LIPIDFORUM meeting at the Danish Technical University, Feb. 1998.

General information
State: Published
Organisations: National Institute of Aquatic Resources
Authors: Jørgensen, B. M. (Intern)
Number of pages: 2
Publication date: 1998

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 169405
Multivariate data analysis used for investigations of the sensory quality of fish

General information
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Martens, M. (Ekstern), Jørgensen, B. (Intern)
Pages: 325-332
Publication date: 1998

Host publication information
Title of host publication: Methods to Determine the Freshness of Fish in research and Industry
Place of publication: Paris
Publisher: IIR
Main Research Area: Technical/natural sciences

Bibliographical note
Proceedings of the Final Meeting of the Concerted Action "Evaluation of Fish Freshness" AIR3CT94 2283, Nantes, Paris, November 12-14, 1997
Source: orbit
Source-ID: 226607
Publication: Research › Book chapter – Annual report year: 1998

Aqueous solutions of proline and NaCl studied by differential scanning calorimetry at subzero temperatures
The hydration properties of proline are studied by differential scanning calorimetry (DSC) in aqueous solutions during freezing to -60 degrees C and subsequent heating to +20 degrees C. The concentration of proline in the freeze concentrated solution was estimated to approximately 50 wt% (w/w) indicating a high water solubility of proline at subzero temperatures. No glass transition was observed within the concentration range 0.9-40.1 wt% (w/w), neither at a low scanning rate of 2.5 degrees C/min nor at a higher scanning rate of 10 degrees C/min. Eutectic crystallization of proline was not observed during freezing or melting which shows that proline has the ability to stay in solution at subzero temperatures. Samples containing proline-NaCl-water were also investigated by DSC and it was shown that the solubility of proline is maintained in aqueous salt solutions at temperatures as low as -60 degrees C. From DSC measurements it was found that the eutectic crystallization of NaCl is prevented by the presence of proline, even when NaCl (initially) is present in molar excess ([NaCl]/[proline] = 2.6). The possible association of these findings with the occurrence of proline accumulation in some plants and insects living under water stress conditions is discussed. (C) 1997 Elsevier Science B.V.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Rasmussen, P. H. (Intern), Jørgensen, B. (Intern), Nielsen, J. (Intern)
Pages: 23-30
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Thermochimica Acta
Volume: 303
Issue number: 1
ISSN (Print): 0040-6031
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 0.683 SNIP 1.17 CiteScore 2.4
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.706 SNIP 1.125 CiteScore 2.18
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.916 SNIP 1.489 CiteScore 2.56
A sensometric approach to cod-quality measurement

The quality index method was used for describing the sensory quality of thawed whole cod and raw fillet and the quality of boiled fillet was assessed by profiling analysis. These data were compared to the water holding capacity of the minced cod by principal component analysis (PCA) and partial least squares regression. The sensory data and the water holding capacity were correlated to an extent that made possible the prediction of high and low values of water holding capacity. Multivariate methods were also used for extracting some information about the assessor variability. This was done by determining the ability of the assessors to predict the water holding capacity through partial least squares regression and by examining the distances between PCA-models of profiling data from the single assessors. (C) 1997 Elsevier Science Ltd. All rights reserved.
Can near-infrared spectrometry be used to measure quality attributes in frozen cod?

**General information**
State: Published
Organisations: Section for Aquatic Process and Product Technology, National Institute of Aquatic Resources
Authors: Jørgensen, B. (Intern), Jensen, H. S. (Intern)
Pages: 491-496
Publication date: 1997

**Host publication information**
Place of publication: Amsterdam
Publisher: Elsevier
Editors: Luten, J., Børresen, T., Oehlenschläger, J.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 226103
Publication: Research - peer-review › Book chapter – Annual report year: 1997

Cryoprotective properties of proline in cod muscle studied by differential scanning calorimetry

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Rasmussen, P. H. (Intern), Jørgensen, B. (Intern), Nielsen, J. (Intern)
Pages: 293-300
Publication date: 1997
Main Research Area: Technical/natural sciences

**Publication information**
Journal: CryoLetters
Volume: 18
ISSN (Print): 0143-2044
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 0.221 SNIP 0.657 CiteScore 0.71
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.277 SNIP 1.231 CiteScore 0.82
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.467 SNIP 0.916 CiteScore 1.16
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.305 SNIP 0.637 CiteScore 0.98
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.416 SNIP 0.708 CiteScore 1.12
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.708 SNIP 1.28 CiteScore 1.42
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.429 SNIP 0.821
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.403 SNIP 1.088
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
Main Research Area: Technical/natural sciences

Publication information
Journal: Informationen für die Fischwirtschaft aus der Fischereiforschung
Volume: 44
Issue number: 3
ISSN (Print): 1437-5842
Original language: English
Source: orbit
Source-ID: 227206
Publication: Research - peer-review › Journal article – Annual report year: 1997

Måling af kvalitet med funktionelle analyser og protein med nærinfrarød refleksion (NIR) på frosne torskeblokke. Fisk - kvalitet af råvare

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquatic Process and Product Technology
Authors: Beknæs, N. (Intern), Jørgensen, B. (Intern)
Number of pages: 37
Publication date: 1996

Publication information
Publisher: Danmarks Fiskeriundersøgelser
Original language: Danish
Series: DFU-rapport
Number: 10-96
Main Research Area: Technical/natural sciences
Electronic versions:
10_96_m_ling_af_kvalitet_med_funktionelle_analyser_og_protein_med_n_rinfrar_d_refleksion_p_frosne_torskeblokke.pdf
Source: orbit
Source-ID: 225045
Publication: Research › Report – Annual report year: 1996
Projects:

An improved physical understanding of the production of extruded fish feed will enable an optimized raw material utilization (ImProFeed)

National Food Institute
Period: 01/08/2014 → 05/12/2017
Number of participants: 8
Phd Student:
Dethlefsen, Markus Wied (Intern)
Supervisor:
Feyissa, Aberham Hailu (Intern)
Hjermitslev, Niels Harthøj (Ekstern)
Nielsen, Michael Engelbrecht (Intern)
Main Supervisor:
Jørgensen, Bo Munk (Intern)
Examiner:
Chronakis, Ioannis S. (Intern)
Colovic, Radmilo (Ekstern)
Kristensen, Jakob Broberg (Ekstern)

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

Relations
Publications:
Die Hard - improving the physical quality of extruded fish feed pellets
Project: PhD

New analytical process programs- and technologies for optimisation 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

Pilotprojekt for udvikling af direkte fiskeri efter strandkrabber til foderproduktion.

National Food Institute
Research Group for Food Production Engineering
Period: 01/04/2014 → 30/04/2015
Number of participants: 2
Project participant:
Jørgensen, Bo Munk (Intern)
Cold, Ulrik (Intern)

Financing sources
**Micro-algae biomass as an alternative resource for fishmeal and fish oil in the production of fish feed**

National Food Institute  
Period: 01/11/2013 → 15/03/2017  
Number of participants: 6  
Phd Student:  
Safafar, Hamed (Intern)  
Supervisor:  
Møller, Per (Intern)  
Main Supervisor:  
Jacobsen, Charlotte (Intern)  
Examiner:  
Jørgensen, Bo Munk (Intern)  
Barbosa, Maria (Ekstern)  
Hansen, Per Juel (Ekstern)

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

**Relations**

Publications:  
Micro-algae biomass as an alternative resource for fishmeal and fish oil in the production of fish feed  
Project: PhD

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**Engineering Strategies for improving the convenience food production- industry Case**

National Food Institute  
Period: 15/11/2012 → 21/04/2016  
Number of participants: 7  
Phd Student:  
Pedersen, Søren Juhl (Intern)  
Supervisor:  
Kulahci, Murat (Intern)  
Vining, G. Geoffrey (Ekstern)  
Main Supervisor:  
Frosch, Stina (Intern)  
Examiner:  
Jørgensen, Bo Munk (Intern)  
Christensen, Lars Bager (Intern)  
Vanhatalo, Erik (Ekstern)

**Financing sources**  
Source: Internal funding (public)  
Name of research programme: Institut stipendie (DTU) Samf.  
Project: PhD

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**Prediktiv modellering af kvalitetstab af laks gennem værdikæden**

National Food Institute  
Period: 01/10/2012 → 26/04/2017  
Number of participants: 7  
Phd Student:  
Johansson, Gine Ørnholt (Intern)  
Supervisor:
Frosch, Stina (Intern)
Guðjónsdóttir, María (Intern)
Main Supervisor:
Jørgensen, Bo Munk (Intern)
Examiner:
Jacobsen, Charlotte (Intern)
Thorarinsdottir, Kristin Anna (Ekstern)
Ólafsdóttir, Gudrun (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.

Relations

Publications:
Process analysis and data driven optimization in the salmon industry
Project: PhD

Sensory factors in food satisfaction
National Food Institute
Period: 01/11/2011 → 01/04/2015
Number of participants: 6
Phd Student:
Andersen, Barbara Vad (Intern)
Supervisor:
Jørgensen, Bo Munk (Intern)
Main Supervisor:
Hyldig, Grethe (Intern)
Examiner:
Jacobsen, Charlotte (Intern)
Monteleone, Erminio (Ekstern)
Wendin, Karin (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Discovery and characterization of novel bioactive peptides from marine secondary products
National Food Institute
Period: 01/03/2010 → 02/07/2014
Number of participants: 7
Phd Student:
Falkenberg, Susan Skanderup (Intern)
Supervisor:
Jessen, Flemming (Intern)
Stagsted, Jan (Ekstern)
Main Supervisor:
Nielsen, Henrik Hauch (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Kristensson, Hordur G. (Ekstern)
Rustad, Turid (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD
New vision technology for multidimensional quality monitoring of food processes

Department of Informatics and Mathematical Modeling
Period: 01/05/2008 → 31/08/2011
Number of participants: 6
Phd Student:
Dissing, Bjørn Skovlund (Intern)
Supervisor:
Adler-Nissen, Jens (Intern)
Main Supervisor:
Ersbøll, Bjarne Kjær (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Christensen, Lars Bager (Intern)
Parkkinen, Jussi (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 DTU-stip, 2/3 FUR/andet
Project: PhD

Optimal fødevarekvalitet vhj online akustiske metoder og robust kemometri

National Food Institute
Division of Industrial Food Research
Period: 01/04/2008 → 31/03/2011
Number of participants: 3
Project participant:
Jørgensen, Bo Munk (Intern)
Schönemann-Paul, Lisbeth Due (Ekstern)
Project Manager, academic:
Frosch, Stina (Intern)

Integret sporbar kvalitet af fisk

National Food Institute
Period: 01/08/2007 → 27/06/2012
Number of participants: 6
Phd Student:
Rasmussen, Maria-Louise Randrup (Intern)
Supervisor:
Frederiksen, Marco Thorup (Intern)
Main Supervisor:
Jørgensen, Bo Munk (Intern)
Examiner:
Nielsen, Henrik Hauch (Intern)
Brunøe, Karen (Ekstern)
Pérez-Villarreal, Begoña (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Globaliseringsmidler
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

Enzymatic Lipophilisation of Bioactive Compounds
National Food Institute
Period: 01/04/2006 → 30/06/2008
Number of participants: 7
Phd Student:
Lue, Bena-Marie (Intern)
Supervisor:
Jacobsen, Charlotte (Intern)
Jørgensen, Bo Munk (Intern)
Meyer, Anne S. (Intern)
Xu, Xuebing (Intern)
Guo, Zheng (Intern)
Main Supervisor:
Adler-Nissen, Jens (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
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

Forbruger orienteret sensorisk kvalitets model for fisk og fiskeprodukter
National Food Institute
Period: 01/11/2004 → 23/06/2010
Number of participants: 7
Phd Student:
Green-Petersen, Ditte (Intern)
Supervisor:
Jørgensen, Bo Munk (Intern)
Nielsen, Jette (Intern)
Main Supervisor:
Hyldig, Grethe (Intern)
Examiner:
Nielsen, Henrik Hauch (Intern)
Brunø, Karen (Ekstern)
Wendin, Karin (Ekstern)

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

Fleksible Måltidsløsninger - Netværkssamarbejde set fra et virksomhedsperspektiv
National Food Institute
Period: 15/05/2004 → 04/03/2009
Number of participants: 6
Phd Student:
Olsen, Johanne Rønnow (Intern)
Supervisor:
Harmsen, Hanne (Ekstern)
Main Supervisor:
Friis, Alan (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Grunert, Klaus G. (Ekstern)
Jongen, Wim M. F. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: ErhvervsPhD-ordningen VTU
Project: PhD

Oxidationsbeskyttelse af fiskeolieholdige produkter
Department of Chemical and Biochemical Engineering
Period: 01/01/2002 → 18/05/2007
Number of participants: 6
Phd Student:
Bruni Let, Mette (Intern)
Supervisor:
Jacobsen, Charlotte (Intern)
Main Supervisor:
Meyer, Anne S. (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Andersen, Henrik Jørgen (Ekstern)
Nilsson, Astrid (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Offentlig finansiering
Kvalitetstyrings- og dokumentatikonssystem i sildeindustrien. forbedret dataopsamling og multivariat analyse

Department of Systems Biology
Period: 01/04/2001 → 30/05/2006
Number of participants: 6
Phd Student:
Frosch, Stina (Intern)
Supervisor:
Bro, Rasmus (Intern)
Main Supervisor:
Jørgensen, Bo Munk (Intern)
Examiner:
Frisvad, Jens Christian (Intern)
Bassompierre, Marc (Ekstern)
Ridder, Carsten (Ekstern)

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

Sild- denlevende ressource- Det gode produkt

Department of Systems Biology
Period: 01/04/2001 → 27/07/2004
Number of participants: 7
Phd Student:
Nielsen, Durita (Intern)
Supervisor:
Hyldig, Grethe (Intern)
Nielsen, Henrik Hauch (Intern)
Main Supervisor:
Nielsen, Jette (Intern)
Examiner:
Jørgensen, Bo Munk (Intern)
Martens, Magni (Ekstern)
Undeland, Ingrid (Ekstern)

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

Flavour Release from Model Systems - In Vitro and In Vivo Instrumental Measurements

Department of Systems Biology
Period: 01/06/1999 → 08/06/2005
Number of participants: 7
Phd Student:
Haahr, Anne-Mette (Intern)
Supervisor:
Bredie, Wender (Ekstern)
Stahnke, Louise Heller (Intern)
Main Supervisor:
Adler-Nissen, Jens (Intern)
Examiner:
Nielsen, Kristian Fog (Intern)
Jørgensen, Bo Munk (Intern)
Marcussen, Jørn (Ekstern)

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

Efficient data collection and storage
Development of a database for raw data of various kinds (single values, vectors, matrices) so that they are easily accessible for e.g. multivariate analysis.

National Institute of Aquatic Resources
Period: 01/01/1999 → 31/12/1999
Number of participants: 1
Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

Development of multisensor techniques for monitoring the quality of fish.
Physical signals from various instruments like near infrared vision systems, texture meters and electronic noses are correlated to organoleptic and physical/chemical quality parameters by multivariate dataanalysis (projection methods and neural networks). Based on these results, a multisensor device is designed for at line (or even in line) use in the fish production chain.

National Institute of Aquatic Resources
Period: 15/12/1998 → 15/12/2001
Number of participants: 1
Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

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

TMAO aldolase in fish products. A key to reduction of the quality problems connected with formaldehyde and dimethylamine.
The formation of formaldehyde and dimethylamine are main factors in the reduction in quality of lean fish like cod during frozen storage. They are formed from trimethylamine-oxide, catalysed by the enzyme trimethylamine-oxide aldolase (TMAOase; EC 4.1.2.32) which is situated mainly in the inner organs like gall bladder, spleen and kidney. The presence of the enzyme in other marine species is not thoroughly described, and it is to be expected that TMAOase activity may be the cause of formaldehyde formation and quality deterioration in other products than those formed from lean fish. Products of commercial importance to the Nordic fish industry were screened for TMAOase activity. TMAOase was almost only found in gadoid fishes. The TMAOase activity concentrations varied much between individuals. Results from the frozen
storage experiment showed that the formation of formaldehyde at -10°C was both proportional to the TMAOase activity and the storage time. Therefore TMAOase activity concentration can be used as a selection criteria to sort out individuals less suitable to frozen storage.

National Institute of Aquatic Resources
Number of participants: 6
Project participant:
Nielsen, Michael Krogsgaard (Intern)
Berner, Lis (Intern)
Espe, Marit (Ekstern)
Poulsen, Marita (Ekstern)
Einarsson, Sigurdur (Ekstern)
Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 624,000.00 Danish Kroner

Kvalitetsbestemmelse af frosset optøet gaspakket torsk. Modellering med teknologiske parametre

Department of Systems Biology
Period: 01/10/1997 → ...
Number of participants: 6
Phd Student:
Beknæs, Niels (Intern)
Supervisor:
Skov, Lisbeth Due (Ekstern)
Main Supervisor:
Nielsen, Jette (Intern)
Examiner:
Høegh, Lars (Ekstern)
Jørgensen, Bo Munk (Intern)
Sørensen, Nils K. (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
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
Applied multivariate data analysis and measurement techniques.

National Institute of Aquatic Resources
Department of Biotechnology
Department of Systems Biology
Royal Veterinary and Agricultural University
Period: 01/01/1997 → 01/01/9999
Number of participants: 4
Project participant:
Berner, Lis (Intern)
Martens, Harald (Intern)
Munck, Lars (Ekstern)
Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

Fast instrumental methods.
Development and implementation of near-infrared spectrometry and other fast instrumental methods for prediction of quality parameters for raw material and seafood products. Optimization of multivariate data-analytical applications directed towards these goals.

National Institute of Aquatic Resources
Period: 01/01/1997 → …
Number of participants: 2
Project participant:
Berner, Lis (Intern)
Project Manager, organisational:
Jørgensen, Bo Munk (Intern)

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
Hoejmarklaboratory
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: Ukendt
Amount: 9,994,630,00 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

Bundesforschungsanstalt für Fischerei

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-Sotelo, 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

Analytical Chemistry
Analytical Chemistry at FF is a basic activity, aimed at maintaining the chemical-analytical know-how, which is necessary for carrying out general analytical tasks, e.g. analyses for salt, crude protein, and TVB-N. In addition, newer instrumental methods may be part of this general project area, though usually such analyses are developed within specific projects (analysis of peptides, proteins, microbial metabolites, autolytic breakdown-products). The available instrumentation include i.a. 4 HPLC-instruments (UV, DAD, ELSD, RI, fluorescence detection), 3 GC instruments (MS, PFD, FID, olfactory detection), 2 scanners for 2-D-gel electropherograms, NIR, low-resolution NMR, differential scanning calorimeter. The Analytical Quality Group follows up on developments and trends in analytical principles and in analytical quality control that may be relevant for analytical chemistry at FF. This group carries out updating of standard procedures and method descriptions for the purpose of improving quality assurance and minimizing environmental effects, and occasionally manages participation in national and international inter-laboratory tests. Safety activities have been strengthened by the employment of a safety officer. Also, within this project area are placed advisory activities towards internal and external questions on analytical problems. - A central theme of present and planned activities is quality assurance and quality control of standard analytical methods. - External cooperation in the field of chemical analysis of fish with WEFTA Working Group on Analytical Methods (WEFTA = [West] European Fish Technologists’ Association. - The basal chemistry activities, comprising approx. 1 person/year, are financed by the running costs of the department.

National Institute of Aquatic Resources

Period: 01/06/1989 → 31/12/2013
Number of participants: 7
Project participant:
Berner, Lis (Intern)
Stampe-Villadsen, Hanne Lilian (Intern)
Jørgensen, Bo Munk (Intern)
Olsen, Lone Rosenkær (Intern)
Reimers, Karin (Intern)
Haahr, Anne-Mette (Intern)

Project Manager, organisational:
Jensen, Benny (Intern)
Lipid Chemistry
Lipid chemistry activities at FF are related partly to projects that are based in the fish oil and fish meal area, and partly to projects studying the formation of lipid-derived aroma and flavours. Lipid oxidation is a central topic. Lipid analytical methods maintained at FF comprise analysis of lipid content by extraction or occasionally by NIR or microwave methods. Lipid class analysis is carried out using the principle of solid phase extraction. Fatty acid composition is an important parameter in studies both of fish and of fish oil. Capillary gas chromatography, with detection by flame ionization or, occasionally, with mass spectrometric analysis is used. Oxidation parameters are analyzed traditionally (e.g. peroxide value). Polymer formation is analyzed using high performance size exclusion chromatography. Oxidative stability of edible oils, and thereby the effect of various antioxidants, is assessed using accelerated methods (Rancimat, Oxidograph). Formation of volatile products of lipid oxidation is analyzed using headspace chromatography with adsorbent trapping, thermal desorption, and gas chromatography with detection by flame ionization, mass spectrometry or olfactometry (sniffing analysis). - The basal lipid activities are financed by the related projects and by the basic running costs of the department.

National Institute of Aquatic Resources
Period: 01/06/1989 → …
Number of participants: 2
Project participant:
Jørgensen, Bo Munk (Intern)
Project Manager, organisational:
Jensen, Benny (Intern)
Project Activities:

Norges Forskningsråd (External organisation)
Period: 21 Jan 2015
Bo Munk Jørgensen (Member)
National Food Institute
Division of Industrial Food Research

Description
Vurdering af ansøgninger til Norges Forskningsråd (NFR). (Den seneste af en række vurderingsopgaver for NFR)
Degree of recognition: International

Related external organisation

Norges Forskningsråd
Activity: Membership › Membership in review committee