HAL
open science

Quantification of partial volatile basic nitrogen by SPME-GC-MS : Application to the monitoring of the evolution of cod fillets (Gadus morhua) freshness

Alexandre Dehaut, Simon Duthen, Thierry Grard, Frédéric Krzewinski, Assi N'Guessan, Anne Brisabois, Guillaume Duflos

To cite this version:

Alexandre Dehaut, Simon Duthen, Thierry Grard, Frédéric Krzewinski, Assi N'Guessan, et al.. Quantification of partial volatile basic nitrogen by SPME-GC-MS : Application to the monitoring of the evolution of cod fillets (Gadus morhua) freshness. Colloque Qualité et Sécurité des Produits Aquatiques (QSPA), Jun 2015, Boulogne-sur-Mer, France. anses-03889638

HAL Id: anses-03889638

https://anses.hal.science/anses-03889638

Submitted on 8 Dec 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

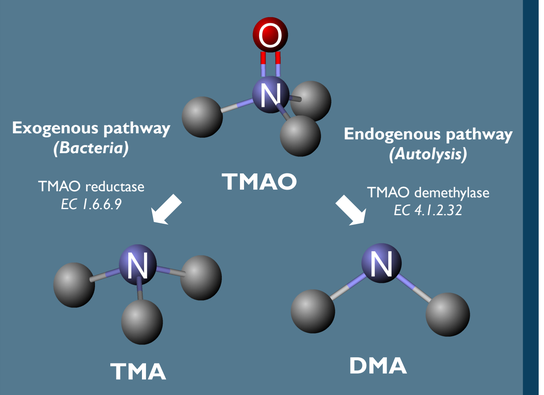
Quantification of partial volatile basic nitrogen by SPME-GC-MS :

Application to the monitoring of the evolution of cod fillets (*Gadus morhua*) freshness

Alexandre DEHAUT[1], Simon DUTHEN[1], Thierry GRARD[2], Frédéric KRZEWINSKI[3], Assi N'GUESSAN[4], Anne BRISABOIS[1] & Guillaume DUFLOS[1]

Introduction

- Freshness is a key issue for the fish industry as fish is a higlhy perishable matrix.
- Numerous methods have been developped using sensory, biochemical and physical analyses. Unfortunatly all of them possess drawbacks.
- Wild gadidae fishes are known to have huge quantities of TMAO in their flesh.



In these species, TMAO can be catabolised following two pathways leading to the synthesis of both TMA, molecule responsible of the fish off-odor and DMA.

Aims

Use SPME-GC-MS to detect and quantify both TMA and DMA.

Use TMA and DMA measures to characterize the early loss of freshness.

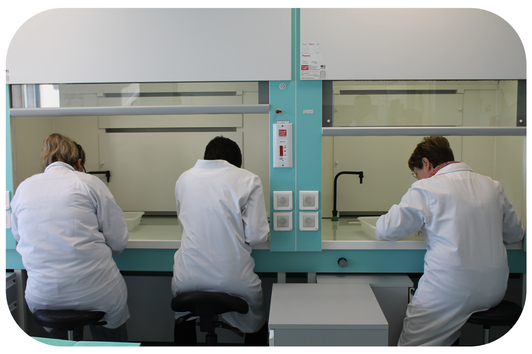
Conclusion

- Reference anaylisis used for this study lead to coherent results.
- PVB-N analysis by SPME-GC-MS allowed to quantify both TMA and DMA after a simple sample preparation.
- After 6-7 days, fillets were considered as unfit for human consumption.
- PVB-N and TVB-N produced similar and higly correlated results for TMA.
- TMA and DMA data obtained by PVB-N were successfuly modeled without possibility to use them as freshness indicator.
- Combination of TMA and DMA allow to determine DTR, a ratio which strongly decreases with the early steps of the decrease of the fillets freshness.
- DTR is a promissing tool to study the fish freshness.
- It should be interesting to use DTR as a marker of fish quality in an another thematic : frozen/frozen-thawed fish.

Materials & Methods

Eleven wild cods (*Gadus morhua*) of the best quality available at Boulogne-sur-Mer were filleted and packed on melting ice.

A single polystyrene box containing three fillets was withdrawn and analysed, by the 3 approaches, for each days D1, D4, D7, D9, D11, D14 and D16.



Sensorial analysis using QIM method

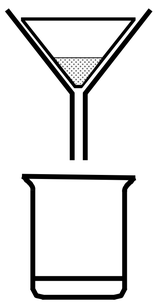
(Cardenas Bonilla *et al.*, 2005)

TMA & TVB-N analysis

(Malle & Poumeyrol, 1989)

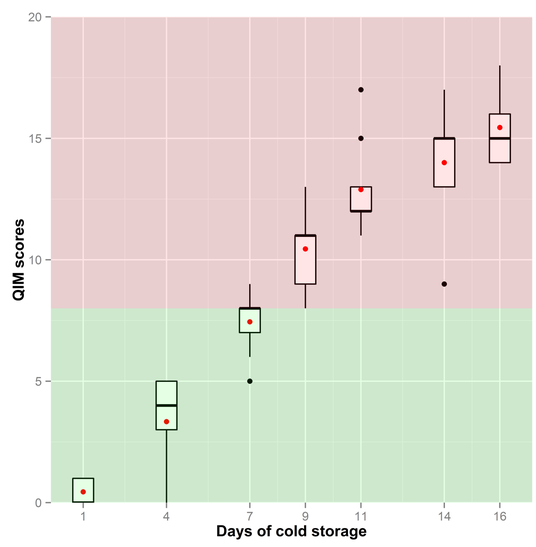
PVB-N analysis

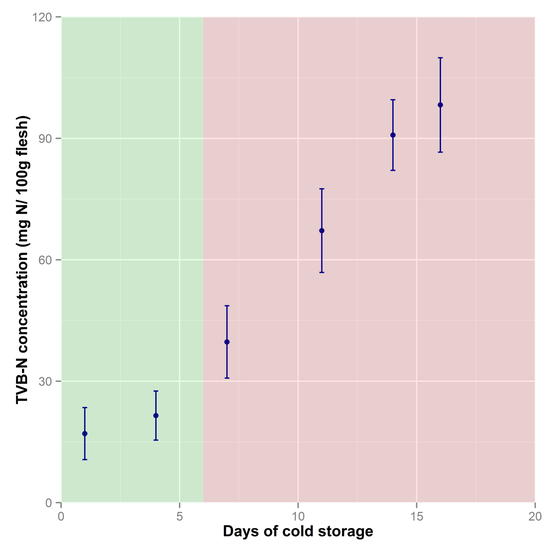
(TMA & DMA by SPME-GC-MS)



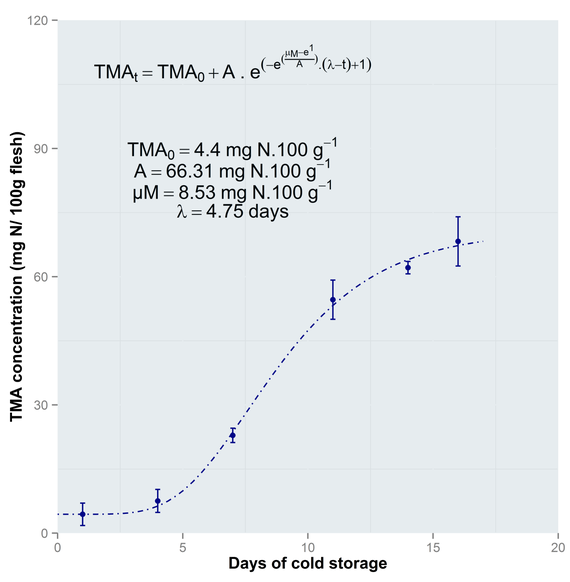
Grinding with 7.5% (w/w) TCA and filtration

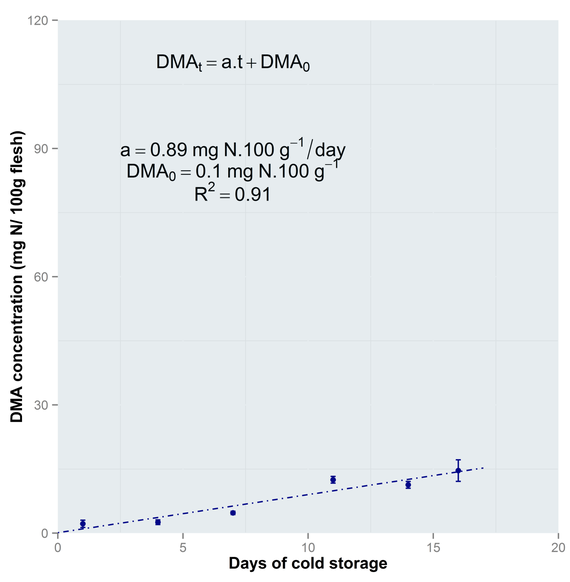
Results

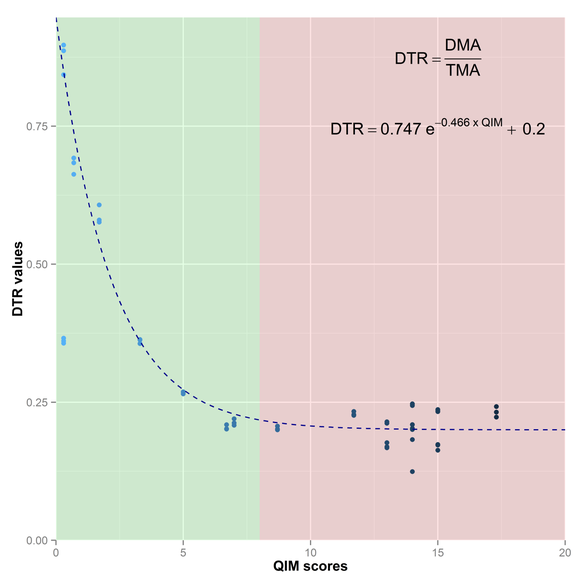




➔Fillets considered as spoiled after 6 to 7 days of analysis depending on the methods of analysis (QIM or TVB-N).







➔TMA measures from TVB-N and PVB-N analysis are highly correlated (r = 0.98) and not significantly different.

➔Quantification of TMA by SPME displays a good repetability of measurments.

➔Successful modelization TMA production with modified-Gompertz model. A high correlation with the QIM (r=0.97) is observed.

➔PVB-N analysis allow to monitor the production of DMA. A good correlation is also recorded with the QIM (r=0.93).

➔Combination of PVB-N data (TMA and DMA) to monitor the loss of freshness.

➔Marked decrease of DMA on TMA Ratio (DTR) together with the increase of spoilage.

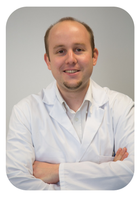
➔DTR could be used as a marker to monitor the early steps of the loss of quality/freshness.

[1] Anses, Laboratoire de Sécurité des Aliments – Département des Produits de la Pêche et de l'Aquaculture, Boulevard du Bassin Napoléon, 62200 Boulogne-sur-Mer, France.

[2] Université du Littoral Côte d'Opale – Anses, Équipe Biochimie des Produits Aquatiques, Boulevard du Bassin Napoléon, 62200 Boulogne-sur-mer, France

[3] Université de Lille 1, Unité de Glycobiologie Structurale et Fonctionnelle, UGSF - Bâtiment C9, 59650 Villeneuve d'Ascq, France

[4] Université de Lille 1, Laboratoire Paul Painlevé – UMR CNRS 8524, Cité Scientifique, 59650 Villeneuve d'Ascq, France

Thanks: Coming from Alexandre Dehaut's Ph.D work co-funded by the Nord-Pas-de-Calais region and Anses

anses.fr
alexandre.dehaut@anses.fr