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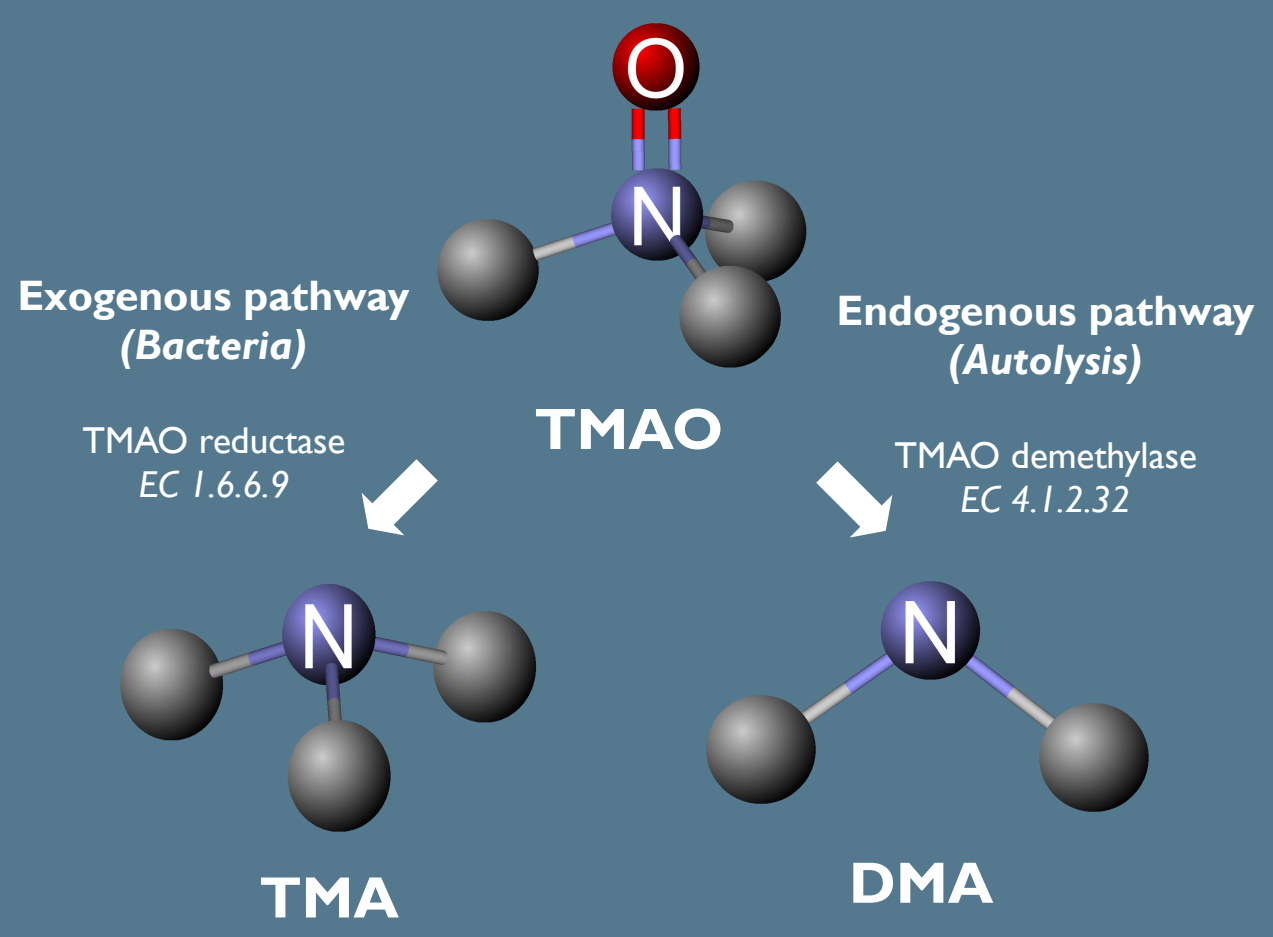
Quantification of partial volatile basic nitrogen by SPME-GC-MS :

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

Alexandre DEHAUT¹, Simon DUTHEN¹, Thierry GRARD², Frédéric KRZEWINSKI³, Assi N'GUESSAN⁴, Anne BRISABOIS¹ & Guillaume DUFLOS¹

Introduction

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

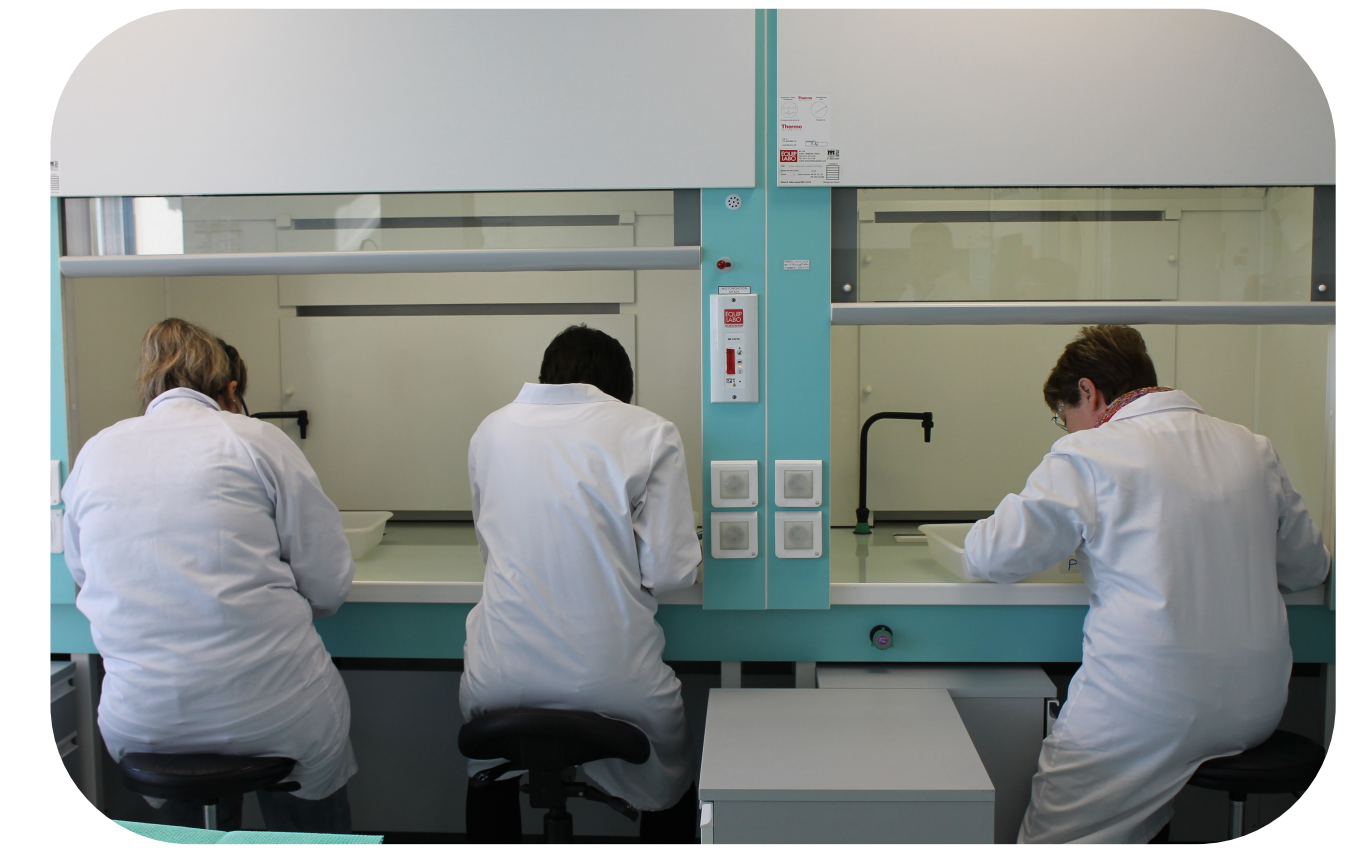


In these species, TMAO can be catabolised following two pathways leading to the synthesis of both TMA, molecule responsible of the fish off-odor and DMA.

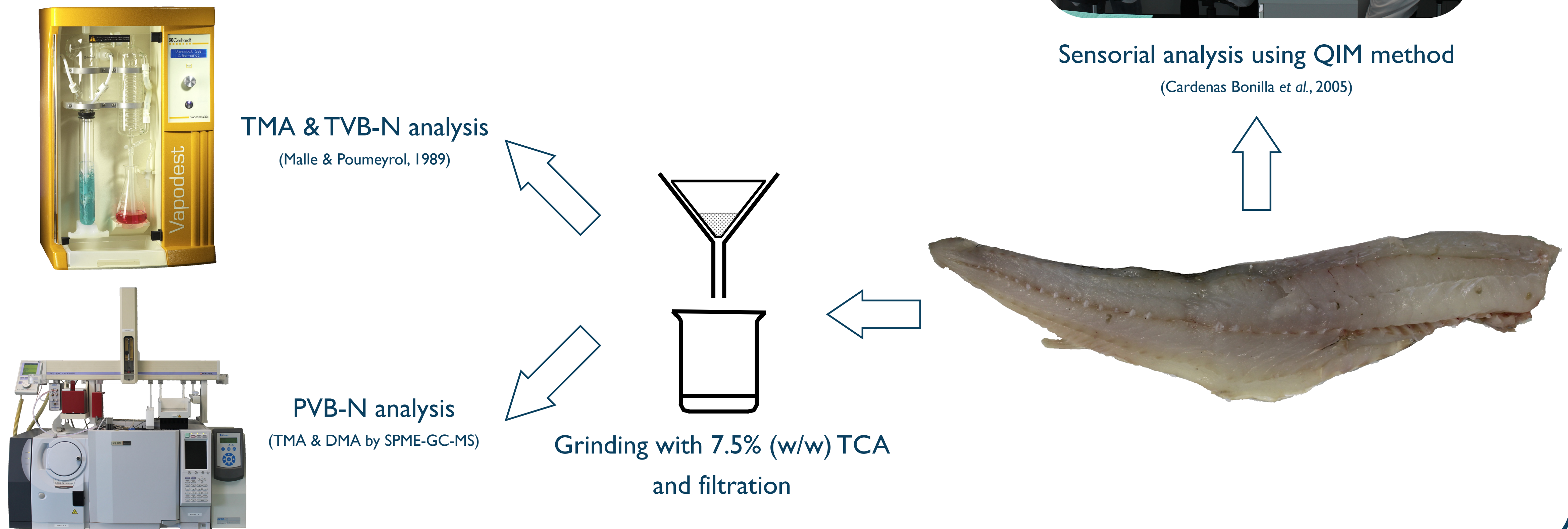
Materials & Methods

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A single polystyrene box containing three fillets was withdrawn and analysed, by the 3 approaches, for each days D1, D4, D7, D9, D11, D14 and D16.



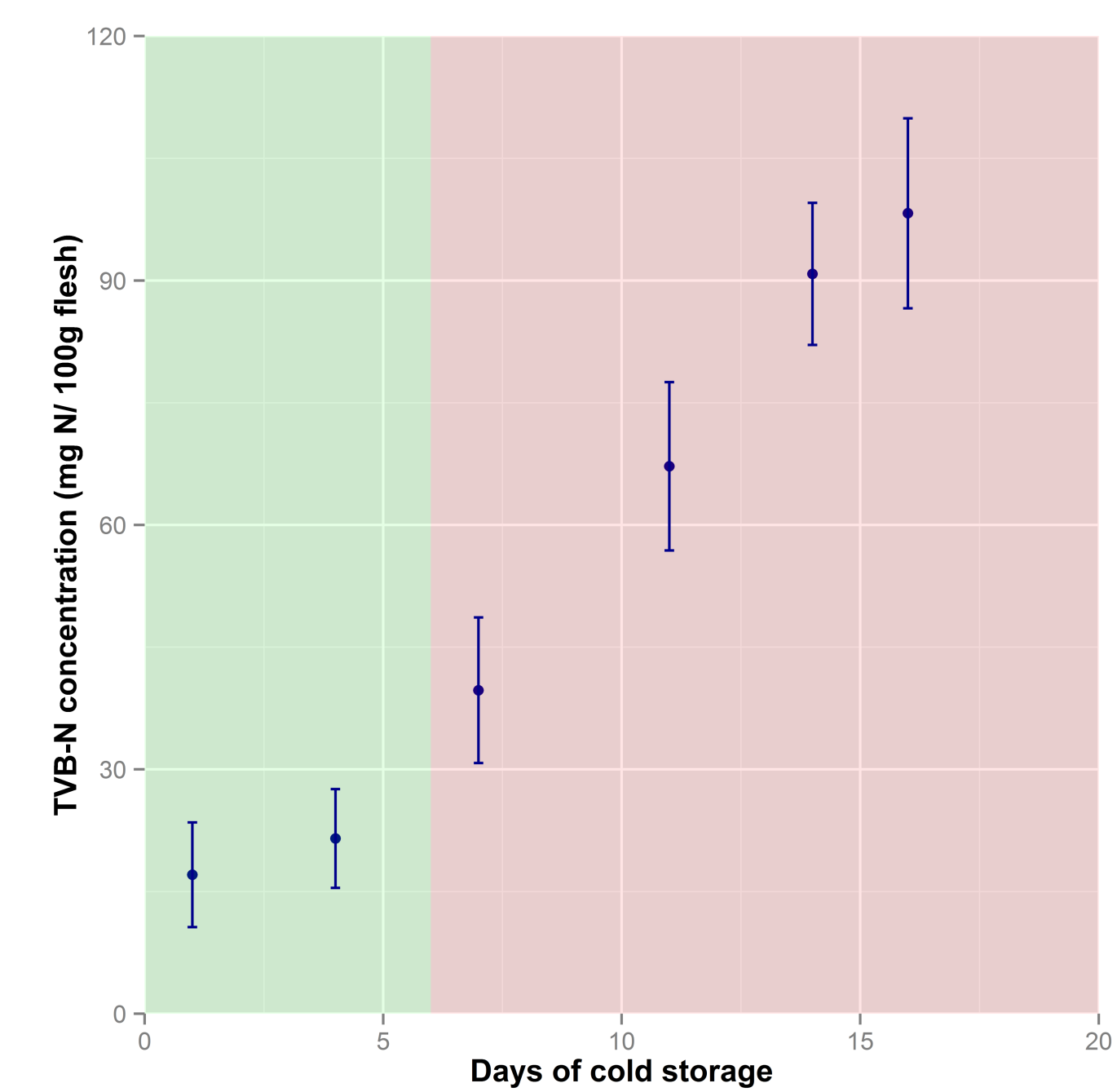
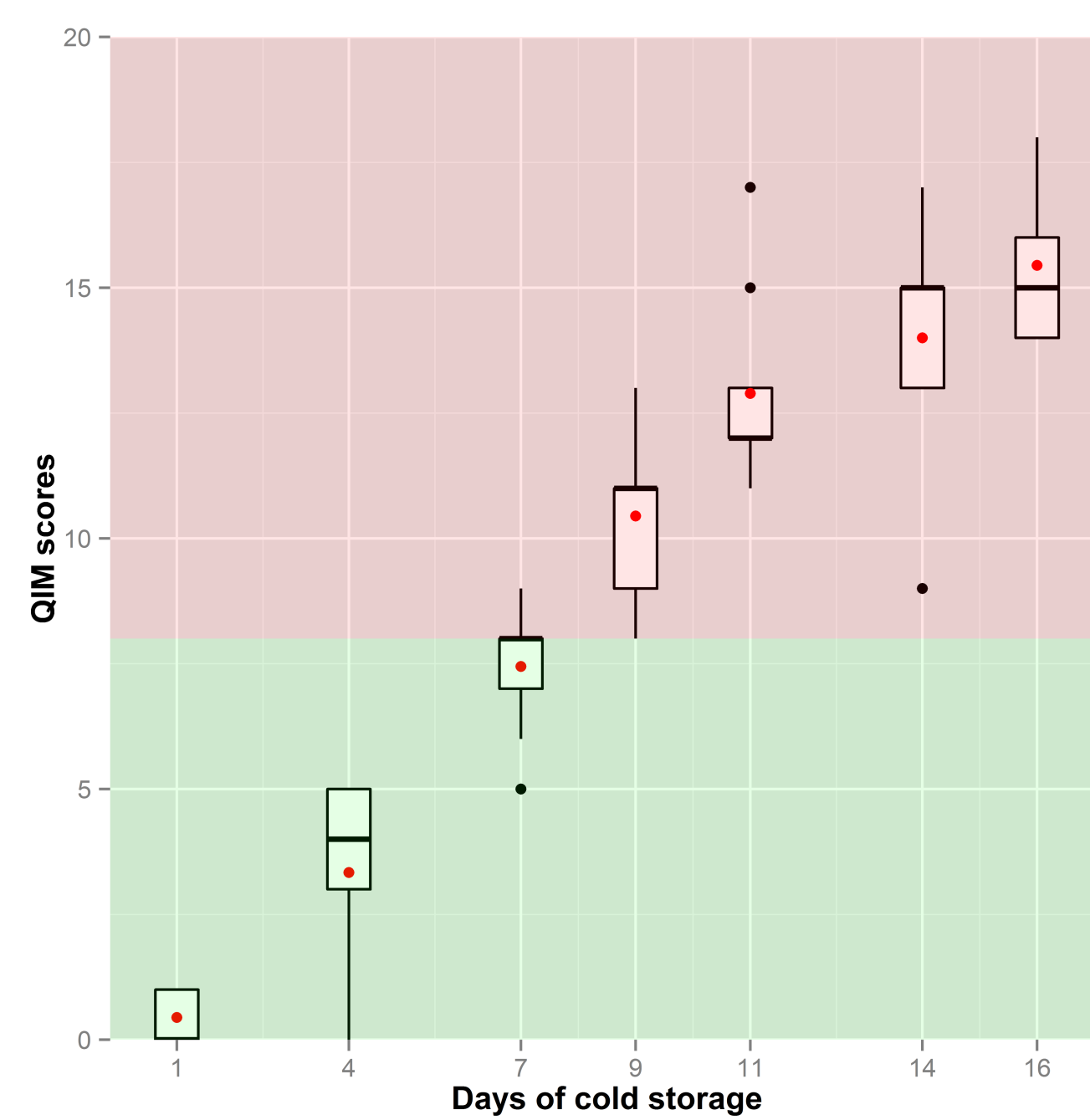
Sensorial analysis using QIM method (Cardenas Bonilla et al., 2005)



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.

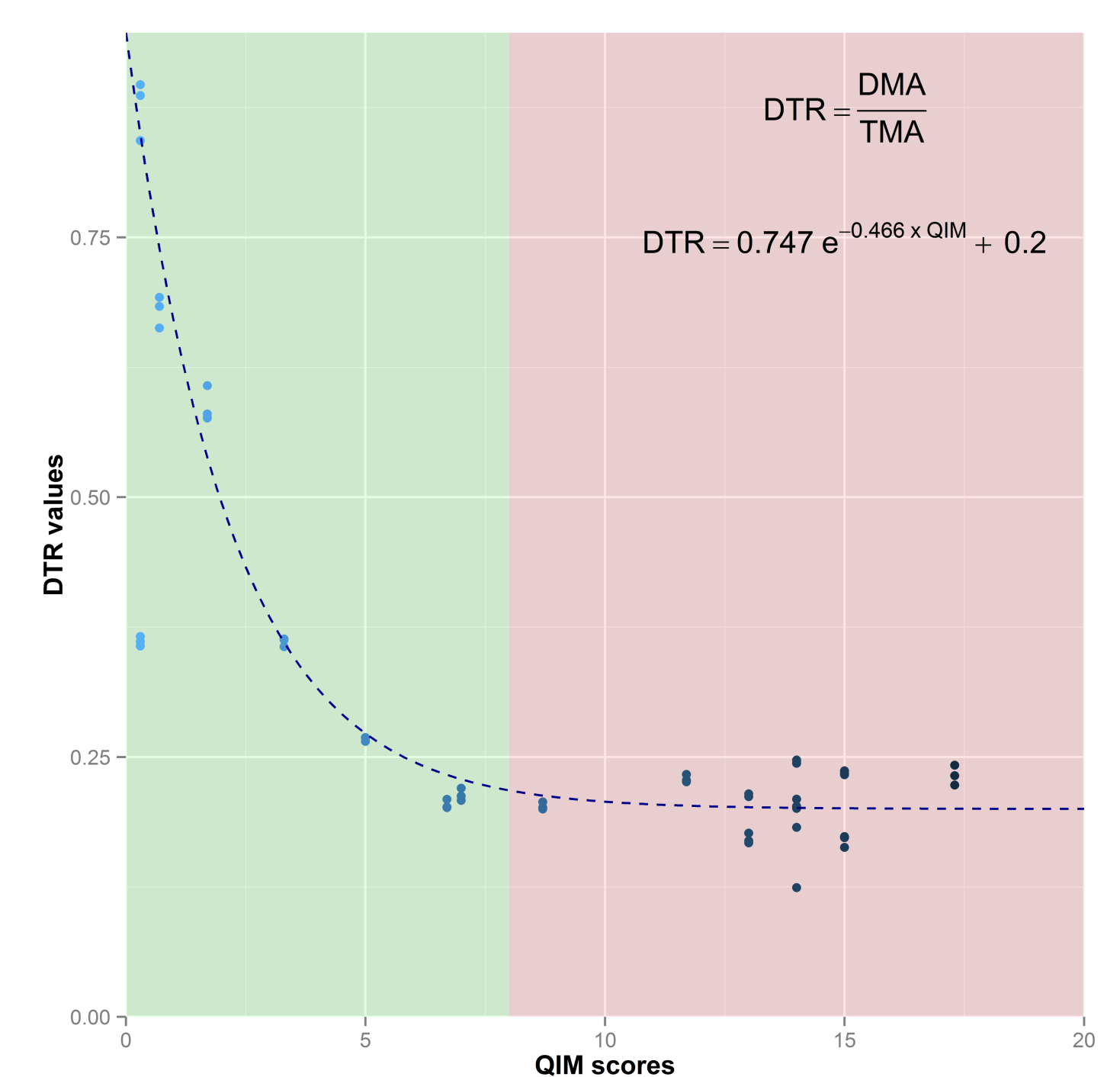
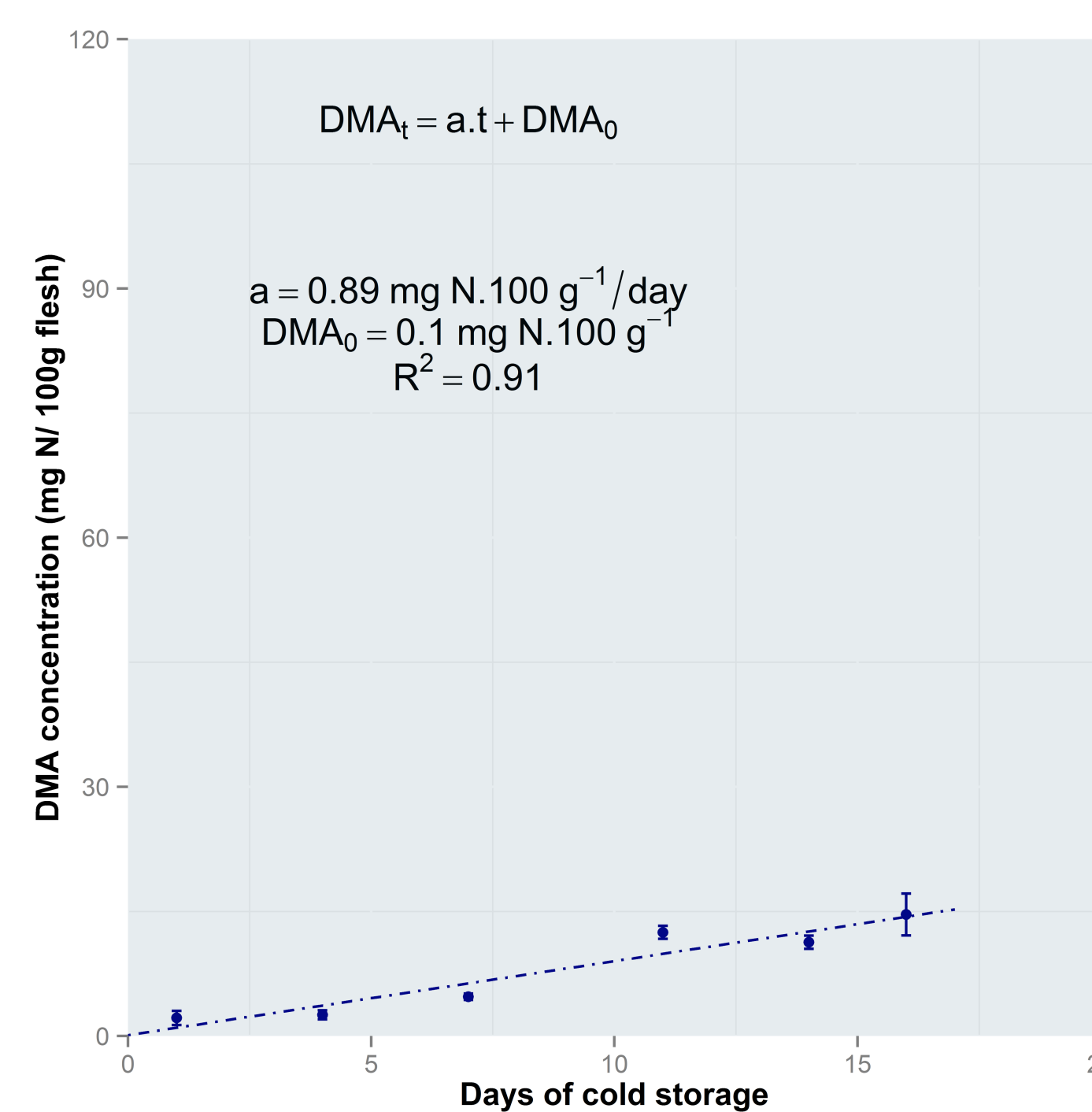
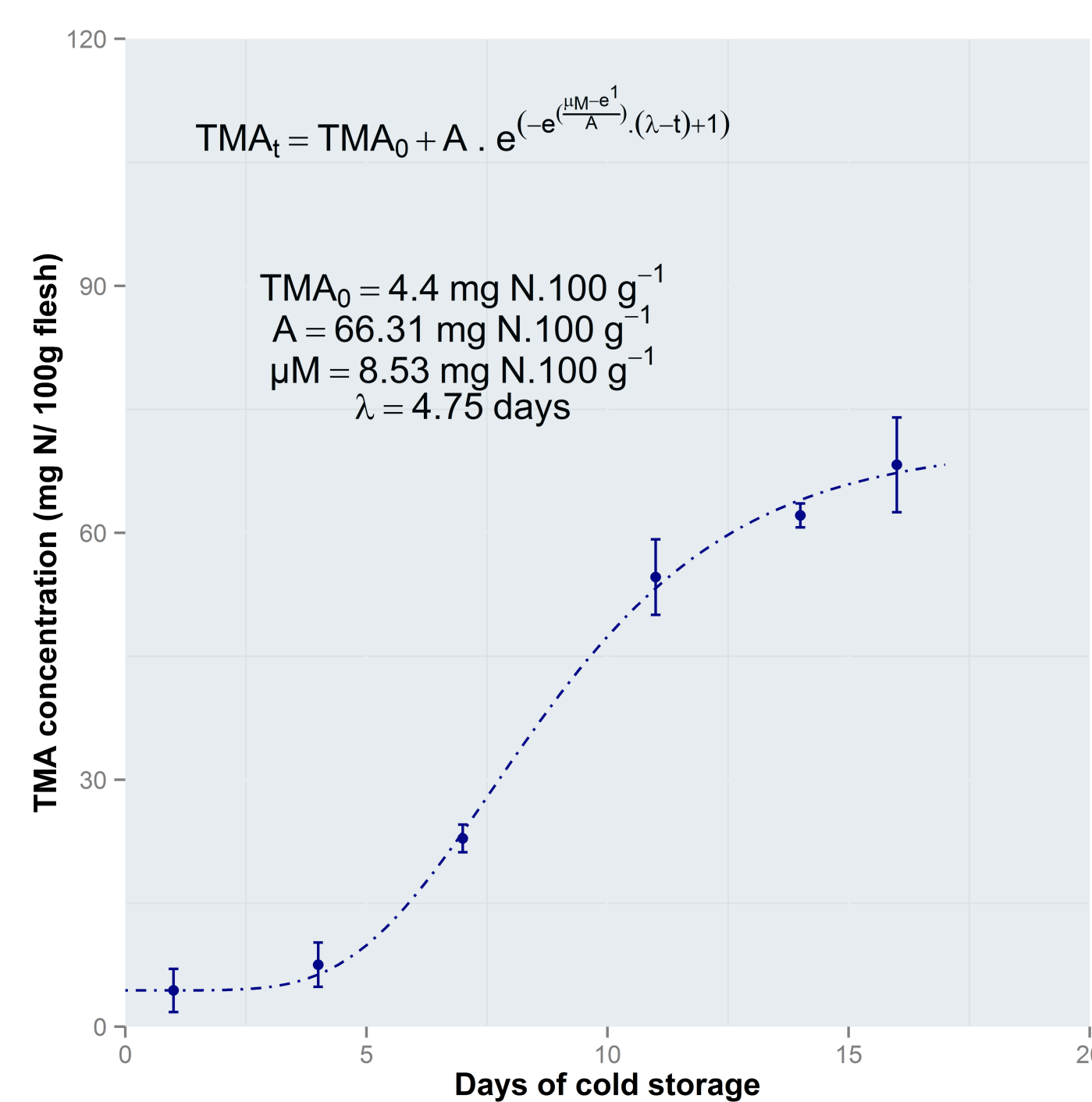
Results



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

Conclusion

- Reference analysis 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 highly correlated results for TMA.
- TMA and DMA data obtained by PVB-N were successfully 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 promising tool to study the fish freshness.
- It should be interesting to use DTR as a marker of fish quality in another thematic : frozen/ frozen-thawed fish.



→ 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 repeatability of measurements.

→ 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.

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