Application Note APN05

Analyzing Fish filets using mylab NIR spectroscopy

Introduction

Hardly any raw material is completely consistent – and natural variation can be particularly pronounced in fish. Species, season, fishing area, feed and biological factors can all influence fat, protein and water content. For processors, the challenge is to produce products of consistently high quality from raw materials with varying compositions.

The mylab NIR-Analyzer

The mylab NIR-Analyzer provides key information about the composition of milk and dairy products in less than a minute. Raw materials can be characterized as early as the receiving stage and allocated to different production processes based on their composition.

During production, rapid measurements help ensure that product formulations and batches meet the desired target values. This makes the mylab NIR-Analyzer a fast and cost-effective alternative to a wide range of conventional wet-chemical laboratory methods.

Analyzing Samples of Fish

The sample of minced fish filet is placed in the sample dish, which is then positioned on the measurement field of the instrument. The sample measurement is completed within seconds, and the selected parameters are quantitatively determined.

Experimental

For sample analysis, approximately 100 g of minced fish filets dervived from Herring, Blue Whiting and Mackerel was placed in a sample dish. In total, 100 samples were first measured using the mylab NIR-Analyzer and was subsequently sent to the reference laboratory (Prueflabor fuer Lebensmittel, fzmb GmbH) for chemical analysis.

The following parameters were determined: fat, salt and moisture. The calibration models were generated using the reference values and the corresponding NIR spectra, as described in Schewtschenko et al.[1]



Fig.1. The mylab NIR-Analyzer.

[1] *Calibration of the mylab NIR-Analyzer in Food Analysis. 2025. Schewtschenko O, Meuche F., Muecke A, Wietstock S, and Heise J. 2025. White Paper*

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Results and Discussion

To assess the performance of the mylab NIR calibration models, the coefficient of determination (R^2) was used. R^2 indicates how well the NIR-predicted values agree with the corresponding reference values. Values closer to 1 indicate a stronger agreement between predicted and reference values.

Table 1 summarizes the calibration statistics for four parameters measured in 100 different samples of fish: fat, salt and moisture.
The range represents the lowest and highest reference values included in the calibration dataset and indicates the concentration range covered by the calibration model.

The coefficients of determination (R^2) range from 0.99 for product moisture and fat to 0.89 for salt. Figures 2–4 show scatter plots of the NIR-predicted values versus the corresponding reference values for the four parameters.

Table 1. Statistics of mylab NIR-Analyzer measurements.

Parameter	n	Range	R^2
Fat (g/100g)	100	3.4 - 24.4	0.99
Salt (g/100g)	100	0.25 - 1.1	0.89
Moisture (g/100g)	100	57.3 - 78.6	0.99

Conclusion

This application note demonstrates that the mylab NIR-Analyzer is an effective tool for the rapid determination of key compositional parameters in fish.

The NIR-predicted values for fat, salt and moisture showed high agreement with the corresponding reference values, demonstrating the suitability of the system for rapid routine analysis.

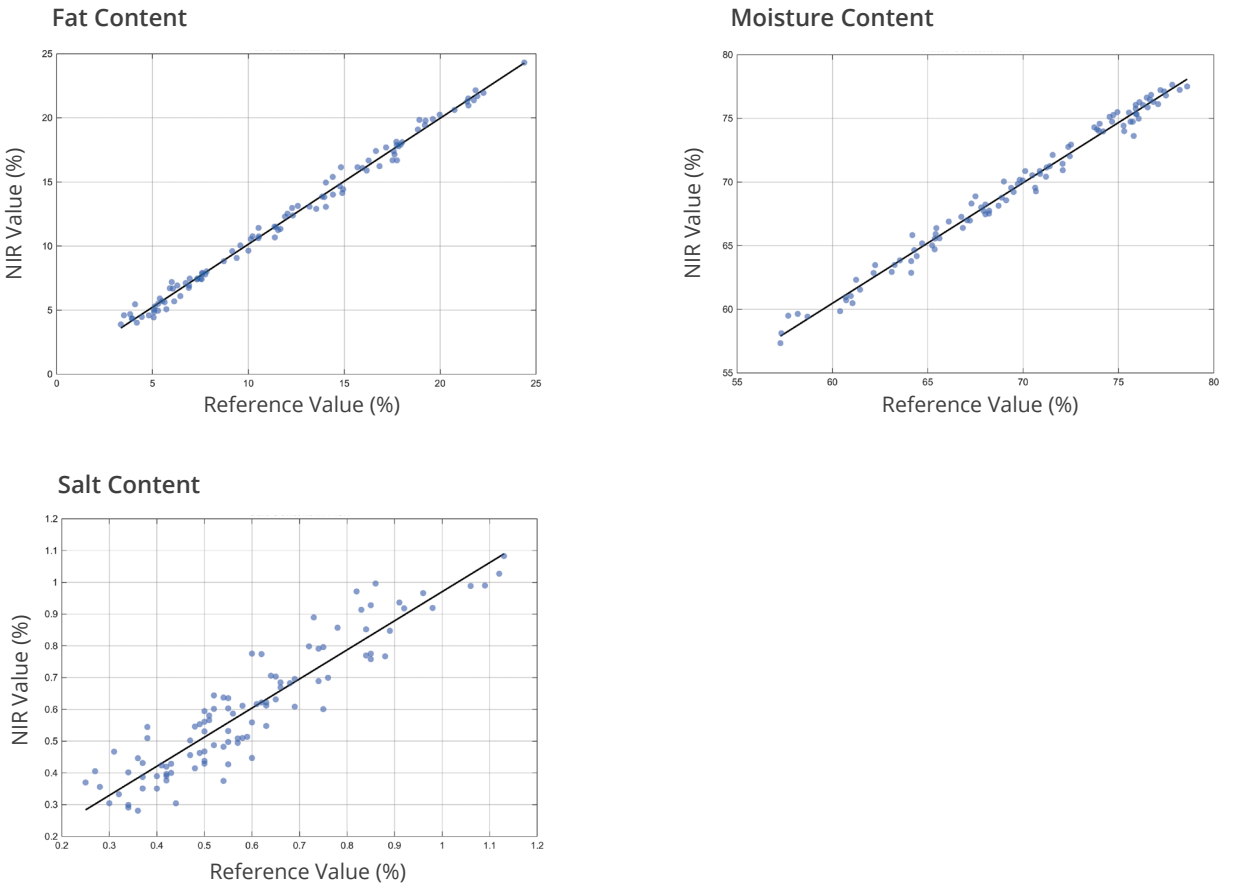


Fig. 2-4. Scatter plots of NIR-predicted and reference values for different parameters in 100 samples of different samples of fish filets. NIR values were acquired using the mylab NIR Analyzer, while reference values were obtained from the Prueflabor fuer Lebensmittel (fzmb GmbH).

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